

National Evaluation of TCV's Green Gym

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*“A state without the means of some change
is without the means of its conservation”*

Edmund Burke 1729-1797

Acknowledgements:

**To all those people who promote, manage and
participate in Green Gyms, my thanks for your part in
the process of this evaluation.**

Paul Yerrell, June 2008

Glossary

| Category | Acronym | Definition |
|--------------------------|-----------|---|
| General | | |
| | TCV | The Conservation Volunteers |
| | DH | Department of Health |
| | GG | Green Gym |
| | NEGG | National Evaluation of Green Gym |
| Questionnaires | | |
| | CQ | Continuation Questionnaire |
| | IQ | Introductory Questionnaire |
| Measures | | |
| | SD | <i>Standard deviation</i> is a measure of the range of a distribution of scores |
| | SF12v2™ | Short Form Health Status Survey, version 2 |
| SF12v2™ | | |
| | PCS Score | Physical Component Summary Score |
| | PCS_ | PCS Score for Introductory Questionnaire |
| | PCS_ | PCS Score for Continuation Questionnaire |
| | PCS_ | PCS Score for CQ minus PCS Score for IQ |
| | MCS Score | Mental Component Summary Score |
| | MCS_ | MCS Score for Introductory Questionnaire |
| | MCS_ | MCS Score for Continuation Questionnaire |
| | MCS_ | MCS Score for CQ minus MCS Score for IQ |
| Physical Activity | | |
| | METs | Metabolic Equivalent Tasks; measure of energy expenditure |
| | METs_ | METs Score for Introductory Questionnaire |
| | METs_ | METs Score for Continuation Questionnaire |
| | METs_ | METs Score for CQ minus METs Score for IQ |
| | VO_ | Volume of oxygen uptake measured during an activity |

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i.0: Executive Summary

i.i: Context

The National Evaluation of Green Gym Projects was undertaken between July 2003 and August 2007. The evaluation was conducted using an Introductory Questionnaire and a Continuation Questionnaire, which were distributed by Green Gym Project Leaders during Green Gym sessions. The questionnaires combined:

- *SF12:version 2*, a standardised health status survey, incorporating 12 questions about: general health and limitations it poses on general activities; limitations posed by physical health; limitations posed by emotional problems; pain experienced; calmness, stress and energy; and health and its interference with social activities. By completing this survey, the scores generated provide two measures of health status, the impact of physical health on everyday activities – the Physical Component Summary Score – and the impact of mental health on everyday activities – the Mental Component Summary Score¹
- Modified questionnaires previously developed by TCV on '*Motivations for joining Green Gym*', '*Benefits of Green Gym to the community*'
- Demographic questions of Green Gym participants, including their previous volunteering and conservation activities
- A self-report physical activities inventory, which was 'translated' into Metabolic Equivalent Tasks (METs); a measure of energy expenditure²

'Benefits of Green Gym to the community' only appeared in the Continuation Questionnaire.

The Continuation Questionnaire was to be completed after a minimum of three months; 67% were completed between three to eight months, for the remaining third a longer gap was recorded.

Seven hundred and three Green Gym participants, from 52 Green Gym Projects completed the Introductory Questionnaire. Of this number, 194 Green Gym participants completed both the Introductory and Continuation Questionnaires.

i.ii: The Green Gym Projects

The 52 projects were located in England, Northern Ireland, Scotland and Wales. They varied in nature, principally, in relation to socio-economic locality and 'recruitment' patterns, which included, for example, both volunteering ('self-referral' participants) and voluntary

¹ More detail on SF12 can be found on pages 17-18.

² See footnote on page 4

involvement of 'referred' participants, following recommendations from health and social care professionals and organisations.

In July 2003, some Green Gym projects were already up-and-running and could be considered established Green Gyms. Other projects commenced during the period of data collection; others closed.

i.iii: The Green Gym Participants

The profile of Green Gym participants showed the diversity of project members and how Green Gym was inclusive in its 'recruitment' in relation to age, gender, marital status, education, housing and employment status. The one exception in the research data was minority ethnic groups; 97% of respondents were 'white'. It is important to note here that this figure does not match with TCV's Management Information System figures for Black and Minority Ethnic groups. Black Minority Ethnic participants of Green Gyms nationally is 14.2% of total Green Gym membership compared to a figure of Black Minority Ethnic citizens in the national population of 7.9% (TCV Management Information System – UK statistics 8th May 2008; 2001 Census).

To illustrate this diversity the following profiles have been highlighted:

- Approximately 80% of Green Gym participants fell equally within four age bands (25-34; 35-44; 45-54; 55-64)
- Males represented around 60% of Green Gym participants. Males also represented about two-thirds of the 66% of Green Gym participants who 'live alone'.
- Those participants with a 'degree' matched the percentage of those with 'no formal qualifications', approximately 30%. Within these two groups the 'gender' proportions varied; with 56% of women holding a degree and 82% of men with no formal qualification. Over 45% of married Green Gym participants had a degree, compared to 55% of single members. Eighty-two percent of Green Gym participants, who had no formal qualifications, were single.
- 71% of Green Gym participants (N = 219) responding to a question on employment were unemployed or retired. Eighty-two percent of Green Gym participants with no formal qualifications were unemployed.

Green Gym participants (N = 564) heard about Green Gym by:

- Word of mouth (15%)
- Communication through organisations or media (49%)
- From health and social care professionals and providers (36%)

'Referrals' from health and social care formed a distinct sub-group of Green Gym participants, with, generally, lower scores on health status measures on the Introductory Questionnaire.

Over 60% of Green Gym participants were new to volunteering and only 32% had been involved in conservation activities before joining the Green Gym. Of those referred by a health professional, over 72% were new to volunteering and to environmental volunteering.

The two factors most highly rated as '*Motivation for joining Green Gym*' were '*Being outdoors*' and '*Improving the environment*'; the lowest rated factors being '*Losing weight*' and '*Being with family or partner*'.

The daily activities of 13% of those who completed the Introductory Questionnaire were likely to be compromised by their physical health, as measured by SF12.

The daily activities of 23% of those who completed the Introductory Questionnaire were likely to be compromised by their mental health, as measured by SF12, which is a higher proportion than found in the general population

i.iv: The Benefits

On '*The benefits of Green Gym in the community*', overwhelmingly, Green Gym participants 'agreed' or 'strongly agreed' with the statements on 'Health and confidence' (99%), 'Skills and training' (94%), 'Contribution to the environment' (92%). Such agreement reflected both a sense of personal achievement and positive self-worth, alongside an appreciation of the political, managerial and bio-diversity aspects of conservation work in the local environment. 'Motivations for joining' were fulfilled by being a member of a Green Gym.

SF12 scores for both physical and mental well-being on the Introductory Questionnaire significantly predicted the difference between the scores on the Introductory and the Continuation Questionnaires. Examination of this pattern of scores strongly suggested that Green Gym participants scoring low on SF12 on the Introductory Questionnaire were those who were 'improving' the most. For example:

- Participants with Physical Component Summary Scores \leq the SF12 mean score of 50³ on the Introductory Questionnaire were 8.9 times more likely to get an equal or higher SF12 score on the Continuation Questionnaire
- Participants with Mental Component Summary Scores \leq the SF12 mean score of 50 on the Introductory Questionnaire were 2.5 times more likely to get an equal or higher SF12 score on the Continuation Questionnaire

³ SF12 Summary Scores are transformed to have a Mean = 50 and a Standard Deviation of +/- 10

This also applies to Green Gym participants' physical activity levels measured in METs⁴:

- Participants with Metabolic Equivalent Task Scores \leq to the average METs score (n= 194 participants) on the Introductory Questionnaire (METs_{int}) are 3.4 times more likely to get a positive Difference Score (METs score on Continuation Questionnaire minus METs score on Introductory Questionnaire; METs_{diff}) higher than the average Difference Score for all participants⁵. Positive Difference Scores reflect an increase in physical activity.

The 'worst off' have more room for improvement or the 'worst off' improve the most? Or both?

i.v: Recommendations

TCV's vision is a better environment where people are valued, included and involved; that everyone has something to offer as a volunteer, regardless of their health status.

Consequently, volunteers with health problems and disabilities are involved in all areas of TCV's work, not just the Green Gym. As a national charity, established in 1959, TCV involves a quarter of a million volunteers each year in a range of projects; for example, and of particular relevance here, since 1994, TCV has worked with Jobcentre Plus Disability Employment Advisers in Yorkshire, who refer people onto TCV programmes.

To support such work, TCV has developed a comprehensive range of policies, procedures and training for staff and volunteers working with vulnerable people. However, because the aim is to provide volunteers with a normalised and integrated experience, TCV staff are not trained to become 'health and social care workers'. Here, TCV's strength is engaging people in environmental activity. When working with vulnerable groups, TCV work in partnership with organisations which can provide the necessary health and social care expertise. In addition, TCV operates a policy of 'indirect supervision' whereby vulnerable groups or individuals are accompanied by a carer when attending TCV activities such as the Green Gym.

Against such a context and in relation to the questions above, further consideration should be given to:

⁴ Energy expenditure for an activity is measured in units known as 'METs' (metabolic equivalents), [*Metabolic Equivalent Tasks; my insertion*] which indicate how many times more energy is used in the activity than would be expended by sitting still (1 MET). Moderate to brisk walking is rated at 3-4 METs, moderate cycling on a stationary bicycle expends 5-6 METs, running at 6mph is rated at 10 METs and a vigorous activity such as cross-country skiing can reach 20 METs. Many exercise machines in a gym (stationary bicycles, treadmills, cross-trainers, etc) have a setting that shows METs. http://www.abpi.org.uk/publications/publication_details/targetObesity/energy2.asp

⁵ The mean of the METs_{int} scores was 41.52 (N=194). The mean of the METs_{diff} scores was 1.85. In the week previous to completing the Introductory Questionnaire the average energy expenditure per participant based on a self-report physical activities inventory was 41.52 METs; the average increase per participant (N=194), the difference between the Continuation Questionnaire and Introductory Questionnaire scores, was 1.85 METs.

- A review of further training of Green Gym Project Leaders to incorporate/differentiate the facilitation of volunteers and referrals from vulnerable groups and the concomitant inclusion/diversity issues
- A review of the organisation of Green Gym sessions, to inculcate the concomitant new objectives addressing the personal development of participants (and possibly carers)
- Further development of the professional relationship with health and social care organisations, in order to continue to address the nature of referrals, their needs and the joint expectations of both the health and social care professionals and TCV

Here, issues relate to the expectations of health and social care organisations in recommending clients to join Green Gyms and the perceived role of Green Gym Project Leaders in facilitating the well-being of participants through green exercise.

Ferlie, Fitzgerald, Wood & Hawkins (2005) recognised that the social and cognitive infrastructures of different professional groups impeded the organisational benefits from multi-disciplinary working, coining the term 'nonspread' to reflect this lack of knowledge transfer and utilisation. The potential 'nonspread' between the social, organisational and cognitive infrastructures of the health and social care organisations, who refer vulnerable groups to Green Gym, on the one hand, and the concept of Green Gym and workings of TCV, on the other, is a possible area for review and development.

Physical well-being engendered by physical activity operates as a working concept in both the domains of Green Gym project leaders and social and health care professionals. However, the professional and therapeutic support of mental well-being may not be 'spread' with the same depth of understanding; does facilitating volunteers in exercise around conservation inculcate the professional expectations and requirements of mental health therapy?

A greater focus on the characteristics of sub-populations of Green Gym participants would be an important factor in further research, particularly if 'referrals' from health and social care professionals continue to be a feature of Green Gym 'recruitment'. With Green Gym being featured in Department of Health (DH) White Papers (DH, 2004, 2006, 2008), there is a strong likelihood that Green Gym will be seen as having an increasing role in the public health agenda, with a concomitant rise in referrals.

Those participants who are the worst off – their physical and/or mental health might affect their daily activities – are those that have the room for and are improving the most. The implications of this premiss are:

- In future research on the benefits of green exercise, inclusion criteria should specify participants in a more vulnerable state of health, physically and mentally, and their

numbers should be increased to satisfy effect size and power calculations in order to test out this observation.

- Any such future study should contain a 'control group' to qualify whether a regression to the mean is not present in the 'less vulnerable state of health' participants
- The above conditions would help to rule out confounding variables producing the 'improvement' effect

Variations in SF12 'Difference Scores' in relation to the time-gap between completing the Introductory Questionnaire and the Continuation Questionnaire, strongly suggest that future research should 'control' the data collection points to provide more evidence on the infrastructure of how and when benefits accrue (or not). Knowing how to structure activities, change locations to maximise positive effects would contribute to the knowledge of the green exercise therapy.

These recommendations attempt to address questions such as: what expectations do health and social care professionals have, when recommending more vulnerable adults to join a Green Gym?; what role do Green Gym Project Leaders perceive themselves as fulfilling in projects where, for example, social services suggest membership of the depressed and unemployed? Anecdotal experiences have been shared with the author but there was no systematic data collection in this respect for this research project. However, such narratives exist, as do attendance registers, concordance with volunteering, leaders' perspectives, participants' letters and annotations to questionnaires. The Green Gym projects vary in their nature, and their self-sustainability. Regional, socio-economic variations contribute to a diversity of programmes and ways of working. It is a notable achievement that Green Gym projects already integrate people with mental health problems and learning difficulties with the wider community. Such diversity should be applauded and supported whilst further research seeks more specific answers to the above questions.

Finally, on the basis of this National Evaluation and previous evaluations (Reynolds, 1999; 2002), evidence of the beneficial impact of TCV's Green Gym is increasing and pointing to which groups further focus should be directed. In short, TCV's Green Gym is:

- Recruiting diverse and vulnerable groups to Green Gym projects and integrating them with the wider community
- Demonstrating that through the Green Gym concept, these more vulnerable groups are more likely to improve their scores on measures of physical and mental well-being and physical activity
- Continuing to provide a well-established format for demonstrating the benefits of green exercise in line with public health policies (DH, 2004, 2006, 2008)

Paul Yerrell, School of Health and Social Care, Oxford Brookes University, June 2008

1.0: Section One - Introduction

1.1: TCV and Green Gym

Green Gym (GG) is one of TCV's major projects. TCV's website (<http://www.tcv.org.uk/greengym>) provides a summary of the scheme:

The TCV Green Gym ® is a scheme that inspires you to improve your health and the environment at the same time. It offers you the opportunity to 'work out' in the open air through local, practical environmental or gardening work.

Physically active people are up to 50% less likely to suffer from a heart attack or stroke, but over 70% of us are not active enough to benefit.

We know that we should try to be fitter and healthier, and we are also increasingly aware of how important our local environment is.

Going to gyms and sports centres doesn't appeal to everyone. The TCV Green Gym is a great alternative. It helps people of all ages to be physically active by providing:

- *A regular programme of outdoor sessions of Green Gym activities*
- *Training and development of new skills*
- *Partnerships with local health services*



In March 2008, GG Celebrated 10 Years of activity. In its 10 years since the Sonning Common pilot was created near Reading, the GG has:

- Involved approximately 10,000 volunteers in improving over 2,500 green spaces
- Established 95 GGs across the UK - 20 now run entirely by the volunteers themselves.
- Spread to schools to provide a new way to tackle inactivity in children.

1.2: Green Gym, the Press and White Papers

In the last few years, there has been increasing reference to GG in the national press, but, more importantly, in Department of Health (DH) policy documents on public health (DH, 2004, 2006, 2008).

8. Community organisations can increase opportunities for healthy choices, for example... There are a growing number of green gyms – schemes that support people in gardening or local environmental improvement while providing opportunities for exercise and developing social networks... [such]...activities are beyond the capacity of individuals and their families but they demonstrate how collective action can improve the environment for health.

(DH, 2004; pp79-80)

In Our health, our care, our say: a new direction for community services (DH, 2006)
GG was used as a case study for 'Enabling health, independence and well-being'.

Doncaster's Green Gym – where keeping fit is good for the whole community

Keeping fit doesn't have to be about taking up a new sport or going to the swimming pool. Doncaster's Green Gym is a project run by the local PCT and the British Trust for Conservation Volunteers where people can have a healthy workout in the open air and contribute to local conservation work. Community support worker, Pauline Mitchell, from Thorne Social Education Centre, enjoys getting to the Green Gym almost as much as the people with learning disabilities whom she takes there. "We've taken a derelict allotment and transformed it – clearing the ground, digging it over, planting the seeds and then watering and feeding them. After their hard work they were thrilled to see the shoots come up and then watch the vegetables grow and be able to harvest them and take them home," says Pauline. "The Gym offers so many benefits for the people we work with. It's a holistic activity and as well as helping people to get fit, the work gives them the chance to become involved in something for the whole community. They learn about teamwork and develop new skills. They love going out into the countryside and the work provides a real sense of satisfaction and fulfilment."

(DH, 2006; p47)



In *Healthy Weight, Healthy Lives: A Cross Government Strategy for England* (DH, 2008), GG is recognised as a part of new strategies: ‘...communities are already putting in place measures to encourage physical activity, often to meet environmental, safety or congestion goals.’ (DH, 2008; p20)

The Government has a range of policies and programmes in place that aim to support these efforts.

- *Our continued sponsorship of the Green Flag award scheme and voluntary sector programmes such as The Conservation Volunteers (TCV). Green Gyms provide opportunities for communities to increase their levels of activity in open spaces.*
(DH, 2008; p21)

1.3: Previous Evaluation of Green Gym

The initial GG project was based in Sonning Common in South Oxfordshire and was the subject of a pilot evaluation by the Oxford Centre for Healthcare Research and Development (OCHRAD) at Oxford Brookes University (Reynolds, 1999). Using a battery of physiological tests to measure changes in participants’ fitness over a sixth month period, improvements and in strength and flexibility levels were noted, as were expressions of feeling fitter, having more stamina and greater everyday activity. The SF-36 Health Survey was also completed by participants and revealed improvements in perceptions of general health and a lessening of physical problems impacting on day-to-day functioning. Whilst getting fit was an initial motivator, participants also recorded the social benefits of group work, doing something worthwhile and, importantly, being out in the countryside.

Subsequently, a further study was conducted at Portslade by OCHRAD and Reynolds (2002). With similar objectives to the Sonning Common evaluation, once again a battery of validated questionnaires and physiological measurements were administered at three time points: baseline, three months and six months. A high drop-out rate, only 18 of the initial 37 participants were remaining at six months, influenced the findings, but it was clear that GG ‘...offered new opportunities for volunteering and attracted a new breed of conservation volunteer: those who joined for health reasons’ (Reynolds, 2002; p8).

At Portslade, 30% of participants were unemployed and 45% reported moderate or severe impairments in anxiety and depression (EQ-5D, Health related quality of life instrument). Improvements in such states were noted as measured by the Mental Component Summary Scores of SF-12 (Ware *et al*, 1994). An individual case study showed a renewal of confidence to return to full employment. Some participants showed increases in fitness, decreases in waist-to-hip ratios and weight loss. Furthermore, ‘being in the countryside’,

social interaction and the worthwhileness of projects were, again, motivating factors for joining and adherence.

1.4: The Current Evaluation

Building on these earlier evaluations and to provide more evidence on the health benefits of GG, in 2003, TCV commissioned the School of Health and Social Care, Oxford Brookes University, to conduct a national evaluation of GG projects.

The National Evaluation of Green Gym (NEGG) Projects was undertaken between July 2003 and August 2007. NEGG was conducted using an Introductory Questionnaire (IQ) and a Continuation Questionnaire (CQ), which were distributed by GG Project Leaders during GG sessions.

The questionnaires combined *SF12:version 2* (SF-12v2™; Ware, Kosinski, Turner-Bowker & Gandek, 2002), a standardised health status survey, modified questionnaires previously developed by TCV on '*motivations for joining GG*', '*benefits of GG to the community*', demographic questions of GG participants, including their previous volunteering and conservation activities, and a self-report physical activities inventory, which was 'translated' into Metabolic Equivalent Tasks (METs); a measure of energy expenditure. ('*Benefits of GG to the community*' only appeared in CQ.) The CQ was to be completed after a minimum of three (3) months.

The 52 projects were located in England, Northern Ireland, Scotland and Wales. They varied in nature, principally, in relation to socio-economic locality and 'recruitment' patterns, which included, for example, both volunteering ('self-referral' participants) and voluntary involvement of 'referred' participants, following recommendations from health and social care professionals and organisations.

In July 2003, some GG projects were already up-and-running and could be considered established GGs. Other projects commenced during the period of data collection; others closed.

In summary, this report examines:

- The analyses of the responses of 703 GG participants, from 52 GG Projects, who completed IQ and those of this number (194), who completed both IQ and CQ

- The implications for the infrastructure of GG in relation to the populations of participants, who volunteer (self-refer) or voluntarily agree (referrals) to join projects
- The marketing of GG as a DH recommended 'health benefit' (DH, 2004, 2006, 2008) and the relationship between health and social care organisations and TCV
- The implications for future research

2.0: Section Two - Method

2.1: Design

For financial and logistical reasons, questionnaire survey was the chosen methodology for NEGG.

2.2: The Questionnaires

Two questionnaires were designed: an Introductory Questionnaire (IQ) and a Continuation Questionnaire (CQ). Copies of both questionnaires can be found in **Section Seven - Appendices**, page 82ff.

Section 1 of the questionnaires was comprised of questions about the participants (*About Yourself*). Questions related to:

- Month and year of participant joining GG
- Location of GG project
- Name, post-code and date of birth, identifiers for IQ and CQ comparison; an opportunity was given to use a pseudonym
- Gender
- Marital status
- Accommodation
- Education level obtained
- Employment status and type of employment (for the second print run of IQ)

Age of participants was calculated from date of birth and date of completion of IQ. Ages were categorised into seven bands. **Table 2:1** shows the bands.

| Age | Code |
|-------|------|
| 18-24 | 1 |
| 25-34 | 2 |
| 35-44 | 3 |
| 45-54 | 4 |
| 55-64 | 5 |
| 65-74 | 6 |
| 75+ | 7 |

Table 2:1 Age bands for GG Participants

Section 2 related to participant's volunteering (*About your volunteering*). Questions related to:

- Where the participant heard about GG
- Any previous conservation work and volunteering and its nature
- The participant's motivation for joining GG. Ten (10) statements were rated from low (1) to high (4). These included statements on: the environment and

being outdoors; family, social and community involvement; learning new skills; health benefits relating to fitness, weight loss and stress relief.

The *Motivation for joining* questions were a modified version of a TCV questionnaire developed in the early stages of GG. Space for free text comment was provided in CQ to allow for the notification of other reasons and for the identification of things that would have made regular attendance more feasible.

Section 3 was about *Your Health and Well-being*. Here, *SF12: version 2* (Ware *et al*, 2002) was incorporated into the body of the questionnaires. Permission was sought and a licence gained from *QualityMetric Incorporated and Medical Outcomes Trust* to use the survey. [See below for more detail on SF12.] SF12 is an even shorter form of SF 36 (Ware, Kosinski & Keller, 1994), incorporating 12 questions about: general health and limitations it poses on general activities; limitations posed by physical health; limitations posed by emotional problems; pain experienced; calmness, stress and energy; and health and its interference with social activities.

In this section, in the second print-run, an additional question about the number of times the participants had consulted a health professional in the last four weeks was added; an additional sheet had been used prior to this.

Section 4 was a self-report of physical activity in the week preceding the completion of the questionnaire (*About Other Activities, Sports and Recreation*). Estimates of time spent on activities *Around the Home* and on *Leisure activities, sports and recreation* were reported from 'less than one (1) hour' to 'over three (3) hours'. These estimates were 'translated' into Metabolic Equivalent Tasks (METs); a measure of energy expenditure. METs indicate how many times more energy is used in the activity than would be expended by sitting still (1 MET). Moderate to brisk walking is rated at 3-4 METs, moderate cycling on a stationary bicycle expends 5-6 METs, running at 6mph is rated at 10 METs and a vigorous activity such as cross-country skiing can reach 20 METs. Many exercise machines in a gym (stationary bicycles, treadmills, cross-trainers, etc) have a setting that shows METs. [See below for more detailed definition of METs.]

Green Gym was included in the list and space was provided to notify other activities not included.

In CQ there were minor modifications of the questions to reflect the fact that participants had been involved in GG for at least three months, minimum period of membership before completion of CQ. However, in addition to such modifications a further section was

included, which sought level of agreement to statements *About the benefits of TCV GG projects in the community*. Again, here, this section was based on a TCV questionnaire, which had been used in earlier, local evaluations.

Both the questionnaires took approximately 10-15 minutes to complete. Each participant was provided with an *Information Booklet for Participants in the National Evaluation of Green Gym Projects* (see **Section Seven - Appendices** page 82ff). The booklet explained: the purpose of the questionnaires; that completion of the questionnaire was an informed consent for the data to be included in NEGG; issues of confidentiality and anonymity; support procedures for participants who may have concerns prompted by the questions, particularly SF12; special circumstances, including completion by carers and translation.

Ethical approval was gained from the School of Health and Social Care's and the University's Research Ethics Committees (UREC Registration No: 030024).

2.3: Data Collection

Batches of questionnaires were sent to GG Project Leaders initially and upon request with the instruction to ask participants to complete IQ on joining a GG and CQ after a period of three (3) months. Project Leaders were also instructed to return CQs at six, 12 and 18 months. Participants were provided with a business reply envelope for individual return of the questionnaires to the Report's author at Oxford Brookes.

Participants from 52 projects, located in England, Northern Ireland, Scotland and Wales, returned questionnaires.

2.4: Analysis

Statistical Package for the Social Sciences (Versions 11-16) (SPSS, 2008) software was used to collate and analyse the data from the questionnaires.

2.5: SF12v2™

SF12: version 2 (SF-12v2™; Ware *et al*, 2002) is a multipurpose short-form health status survey with only 12 questions, all of which are selected from the SF36 (Ware, Kosinski & Keller, 1994). For monitoring health outcomes in general populations, SF36 is the most widely-used health survey throughout the world being brief, psychometrically-sound and with a proven record of usefulness in measuring health status. The SF12 incorporates at least one questionnaire item from the eight (8) SF36 health concepts. Its design as a one page (in the original), two minute questionnaire module made it appropriate for use in NEGG.

The eight (8) health concepts include:

- Physical functioning
- Role physical
- Bodily pain
- General health
- Vitality
- Social functioning
- Role emotional
- Mental health

Role physical and *Role emotional* explore the role and impact of physical health and emotional well-being on the execution of day-to-day activities. The responses to the 12 questions contribute to the compilation of a Physical Component Summary (PCS) Score and a Mental Component Summary (MCS) Score. The SF12 PCS Scores and the MCS Scores were transformed to compare to the norms of a 1998 US national population and to have a Mean = 50 and Standard Deviation (SD) = plus/minus 10 (Ware *et al*, 2002). **Standard deviation** is a measure of the range of the distribution of GG participants' Component Summary Scores about the mean. You would expect approximately 70% of the scores to be between 40 (50 – 10) and 60 (50 + 10). Participants with scores below the mean (50) and particularly below 40 (<-1SD) might find their daily activities affected by their physical health or by their emotional health and well-being.

Documentation on how to score and transform SF12 responses into Component Summary Scores can be found in Ware *et al* (2002; pp29-51). These PCS and MCS scores were used in the evaluation of the health benefits of GG.

2.6: METs

An activity's energy requirement is calculated on the basis of a participant's steady state volume of oxygen uptake (VO_2) measured during an activity. The measured oxygen uptake is then used to express energy expenditure. VO_2 is the value in litres of oxygen used per minute. Sometimes this is expressed in millilitres (ml) and in relation to the participant's body weight in kilograms.

Metabolic Equivalent Tasks (METs) derive from the resting metabolic, oxygen uptake, rate, which is approximately 3.5 ml of oxygen per kilogram of body weight per minute. An 8-MET activity has an uptake eight times the resting metabolic rate. As noted above, moderate to brisk walking is rated at 3-4 METs. **Table 2:2** shows the METs values used for participants' scores in the self-report activity section of IQ and CQ.

| MET Scores for: | Mean | Range |
|--------------------------------|-------------|--------------|
| Gardening | 5.0 | 4.0 - 6.0 |
| DIY | 4.5 | 3.0 - 6.0 |
| Shopping | 3.0 | |
| Car Maintenance | 4.0 | |
| Walking | 3.5 | 2.0 - 4.5 |
| Jogging | 6.0 | |
| Dancing | 4.5 | |
| Cycling | 7.0 | 6.0 - 8.0 |
| Keep Fit | 6.0 | |
| Swimming | 6.0 | |
| Exercise: Gym | 5.0 | |
| Court Games | 7.0 | |
| Bowls | 3 | |
| Golf | 4.5 | |
| GG | 5 | 4.0 - 6.0 |
| Other Conservation Work | 5 | |

Table 2:2 METs scores for self-report activity section of IQ and CQ

3.0: Section Three - Results

3.1: Numbers of Green Gym Participants

Seven hundred and three (703) GG participants, from 52 GG Projects completed the Introductory Questionnaire.

Of this number, 194 GG participants completed both Introductory (IQ) and Continuation Questionnaires (CQ).

3.2: Data Analysis

The Introductory Questionnaire data were used to provide profiles of the GG participants. The following variables in **Table 3:1** were used in the analysis of the data from this questionnaire:

| Variable | Description | Data type |
|--|---|-------------------------|
| Date of first joining a GG | Some projects were up and running when data collection began, others commenced during the period of the research | date |
| Date and location of GG project | Participants were identified by GG project base rather than by work sites of the project | date string |
| Age | The age of the GG participant on completion of IQ; 7 age bands were used from 18 - 75+ | numeric |
| Gender | Male/female | nominal |
| Ethnic origin | 7 categories were specified with an 'other' option | nominal |
| Marital Status | 6 categories of relationship were used: Single – married - living with partner – widowed – divorced - separated | nominal |
| Accommodation | 6 categories of living arrangements were used: Owner occupier – privately rented – council/housing association – Living with relatives – hostel – care home | nominal |
| Education | 5 categories of level of educational attainment/qualifications were used: Degree – A level – GCSE/O level – vocational qualification – no formal qualification | nominal |
| Employment | Detail was asked at two levels: 1 – employed/unemployed 2 – nature of employment | nominal |
| Where did you hear about GG? | Participants responses were categorised into 14 sources on GG | nominal |
| Previous conservation work | Detail of previous activities (or not) | nominal |
| Previous volunteering | Detail of previous activities (or not) | nominal |
| Motivation for joining | 10 reasons for joining were ranked high/low | ordinal |
| SF12 | SF12 is a 12 question Short Form health status survey providing two outcome measures: Physical Component Summary (PCS) Score and Mental Component | PCS_ MCS_ numeric |

| | | |
|------------------------|--|------------------|
| | Summary (MCS) Score. The suffix (__) was used to indicate the completion of SF12 in the Introductory Questionnaire | |
| GP visits | Some participants were asked the number of visits made to their GP in last four weeks. | numeric |
| Activity levels | Time spent on activities around the home, for recreation and for sport were recorded. Time spent in hours was converted to a METs ¹ score, a measure of energy expenditure. The suffix (__) was used to indicate the level of activity/energy expenditure in the Introductory Questionnaire | METs_ numeric |

Table 3:1 Variables for IQ

Similar information was collected in CQ, with the addition of the following variables, which were used in the analysis of both questionnaires, IQ and CQ:

| Variable | Description | Data type |
|------------------------|--|---------------------------------|
| Benefits of GG | 14 statements were used in a Likert scale to evaluate the benefits of the GG in the community Three categories were scored: Health and confidence; Skills and training; Contribution to the environment | ordinal |
| SF12 | PCS Scores and MCS Scores recorded in CQ. The suffix (__) was used to indicate the completion of SF12 in the Continuation Questionnaire | PCS_ MCS_ numeric |
| SF12 | PCS and MCS Difference Scores: CQ PCS_ score minus IQ PCS_ score; CQ MCS_ score minus IQ MCS_ score | PCS ____ MCS ____ Numeric |
| Activity levels | The suffix (__) was used to indicate the level of activity/energy expenditure in METs in the CQ | METs_ numeric |
| Activity levels | METs Difference Scores: CQ METs_ score minus IQ METs_ score | METs ____ numeric |

Table 3:2 Variables for IQ/CQ

3.3: Profile of the GG participants:

3.3.1: Age

Figure 3:1 below shows the age range in years for the 669 GG participants, who provided detail of their date of birth. The figure shows an even spread of participants for the range from 25 – 64 years, with lower numbers in the younger and older ranges. This pattern

¹ Energy expenditure for an activity is measured in units known as 'METs' (metabolic equivalents), [*Metabolic Equivalent Tasks; my insertion*] which indicate how many times more energy is used in the activity than would be expended by sitting still (1 MET). Moderate to brisk walking is rated at 3-4 METs, moderate cycling on a stationary bicycle expends 5-6 METs, running at 6mph is rated at 10 METs and a vigorous activity such as cross-country skiing can reach 20 METs. Many exercise machines in a gym (stationary bicycles, treadmills, cross-trainers, etc) have a setting that shows METs.

reflects age range data in previous interim national and local reports (Yerrell, from 2004, TCV unpublished reports).

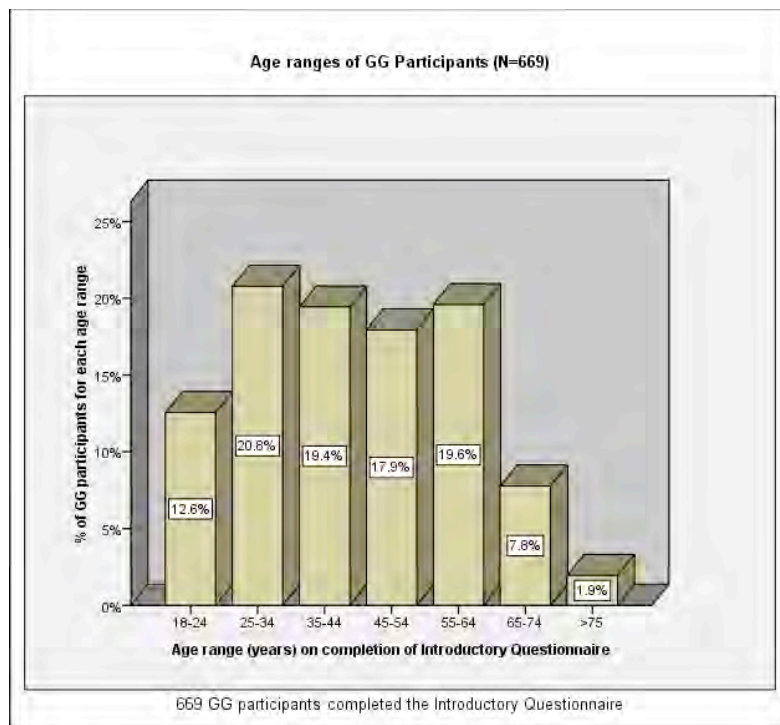


Figure 3:1 Age range (years) of GG participants on completion of IQ

3.3.2: Gender

Figure 3:2 shows that males were just under two-thirds of the participants of GG projects.

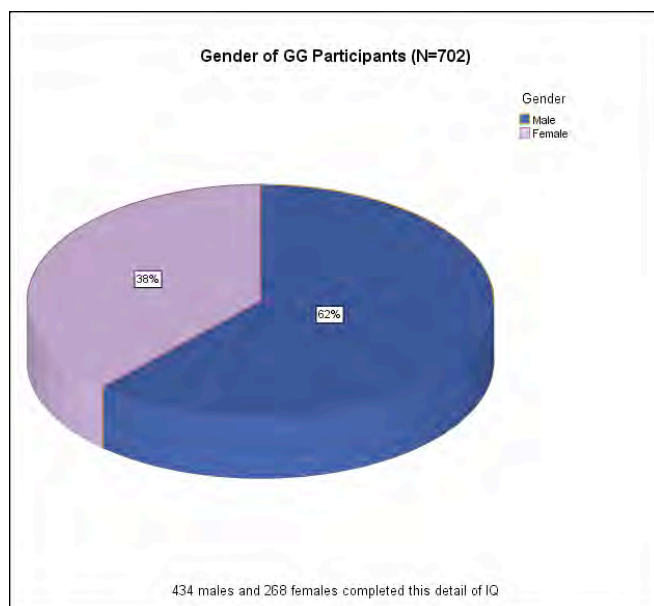


Figure 3:2 Gender of GG participants completing IQ

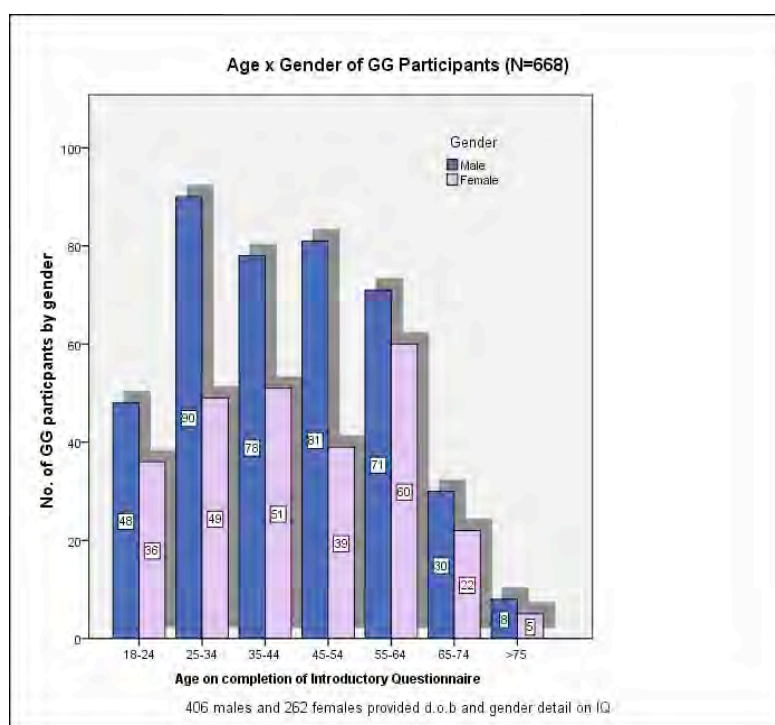


Figure 3:3 Age x Gender of GG participants

Figure 3:3 shows that females were one-half to two-thirds the number of males in all age range categories except for the 55 – 64 group where they reached four-fifths of the male total. Thirty-five (35) participants did not provide detail on either their gender or their date of birth (d.o.b).

3.3.3: Ethnic Origin

Six hundred and ninety-nine (699) GG participants provided detail of their ethnic origin. Ninety-seven per cent were 'White'; there were four 'Black Caribbean' and eight 'Asian (Indian/Pakistani/Bangladeshi)' participants.

3.3.4: Marital Status

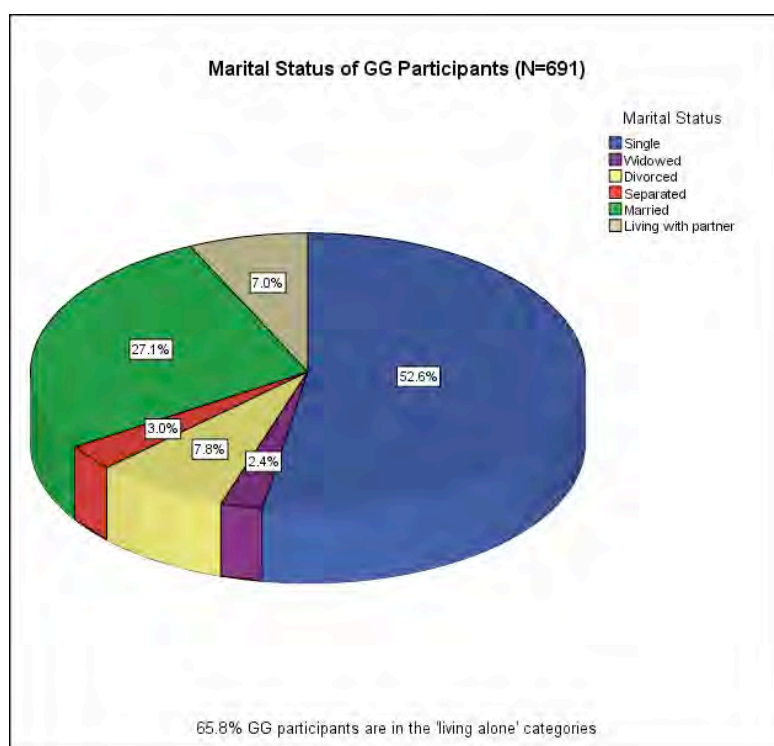


Figure 3:4 Marital Status of GG participants

Figure 3:4 shows that 34.1% of GG participants were 'married' or 'living with partner'. Of the 'living alone' categories (462 participants) 68.4% were males, 31.6% females. This reflects the gender proportions of GG participants (see **Figures 3:2 & 3:3** above).

3.3.5: Accommodation of GG Participants

Figure 3:5 shows the percentages of GG participants' living arrangements, with over 40% being owner-occupiers. Local reports (Yerrell, from 2004, TCV unpublished reports) would show variation in this overall pattern of respondents with regional locality and variations in types of 'recruitment' to GG projects being key factors here; local pie charts showing different distributions.

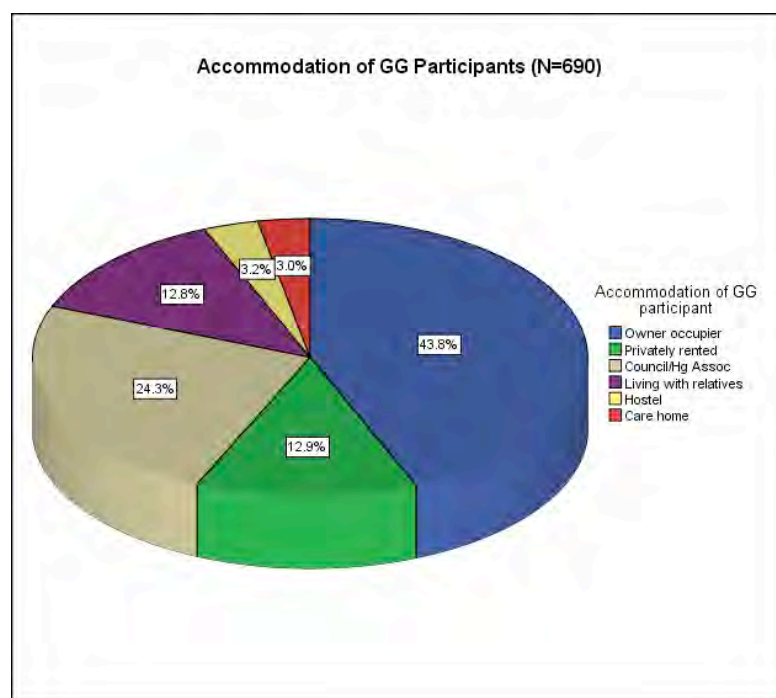


Figure 3:5 Accommodation of GG participants²

3.3.6: Level of Educational Attainment

Figure 3:6 shows the educational attainment of GG participants. Those participants with a 'degree' matches the percentage of those with 'no formal qualifications', approximately 30%. Within these two groups the 'gender' proportions vary; with 56% of women holding a degree and 82% of men with no formal qualification. In the other categories the male/female ratio is approximately 3/2, reflecting gender proportions of GG membership. Again, here, local reports (Yerrell, from 2004, TCV unpublished reports) would show variation in this overall pattern of respondents with regional locality being a key factor; local pie charts showing different distributions.

² Between 1971 and 2002 home ownership increased from 49 to 69 per cent (Living in Britain: The 2002 General Household survey; <http://www.statistics.gov.uk/cci/nugget.asp?id=821> – downloaded 20.06.2008)

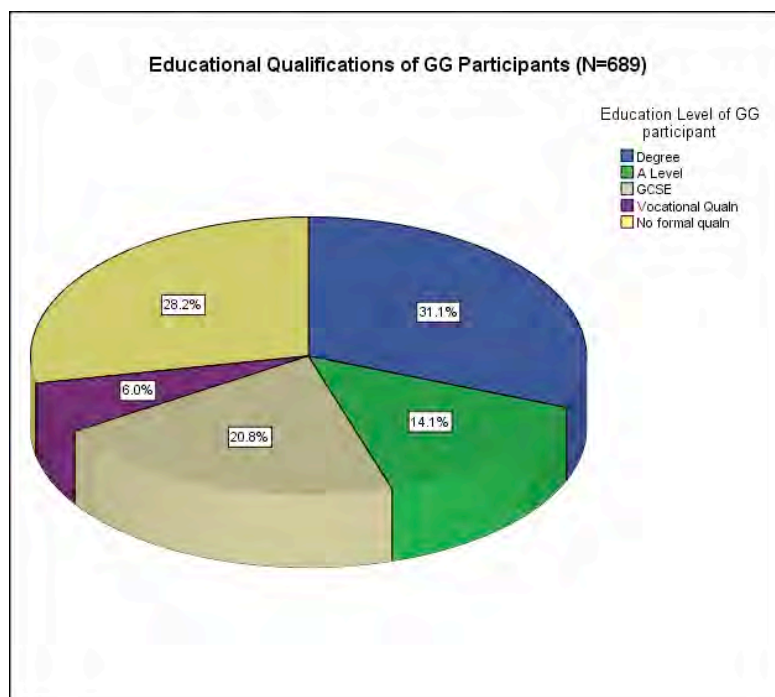


Figure 3:6 Level of Educational Attainment of GG participants

3.3.7: Employment Status

Figure 3:7 shows the employment status of GG participants. The 219 respondents (31% of total number of GG participants) to this question were those completing IQ following the second print-run, when, among other questions that were added, a two-layer question on employment was included on page one, *'About Yourself'*. **Figure 3:7** reflects both layers of the question.

Over half of the respondents were retired/unemployed. Again, here, local reports would show variation in this overall pattern of respondents with regional locality being a key factor. For example, one GG project in the south of England hosted a 'volunteering day' for a local insurance/accountants company (finance category in **Figure 3:7**).

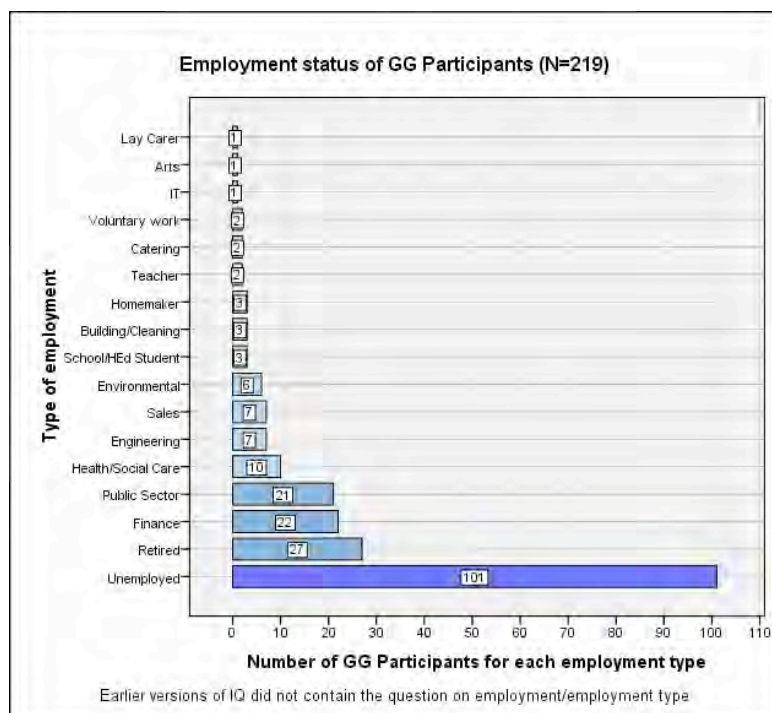


Figure 3:7 Employment status of GG participants

3.3.8: Where did you hear about the Green Gym?

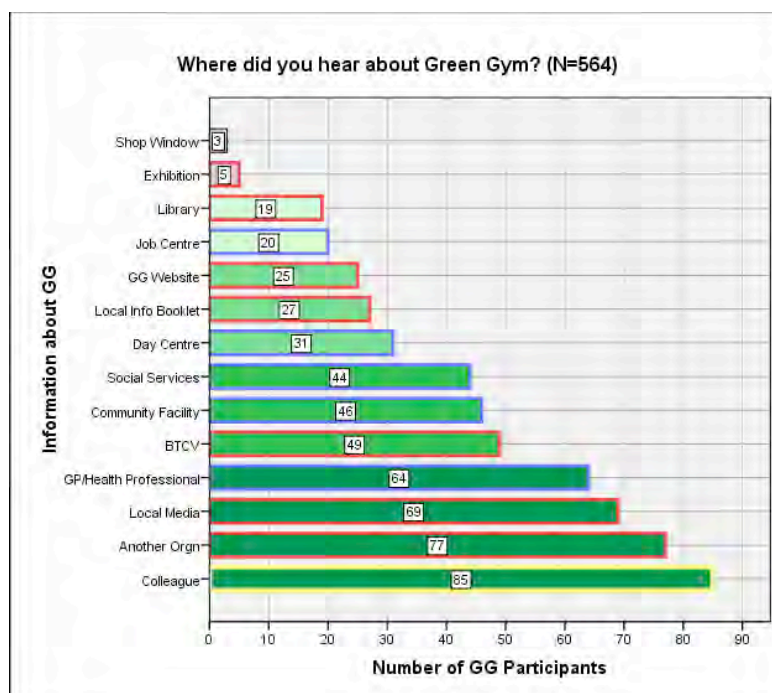


Figure 3:8 Where did GG participants hear about Green Gym?

Figure 3:8 shows the sources of information, which identified the local GG projects to potential participants. Five hundred and sixty-four (564) GG participants recorded their source of information. **Figure 3:8** shows how these sources fall into categories by frequency and by type: four bands of diminishing frequency of source (dark green to light green) and three types: word of mouth from colleague (yellow border); communication through organisations or media (red border); and health and social care provision (blue border). Local GG projects vary in the way participants are 'directed' to them.

3.3.9: Previous Conservation Work and Volunteering

Figure 3:9 shows the previous experience of GG participants in undertaking conservation work and of being a volunteer. For both activities only approximately one third of GG participants have had previous experience of conservation and/or volunteering; 31.5% and 37% respectively.

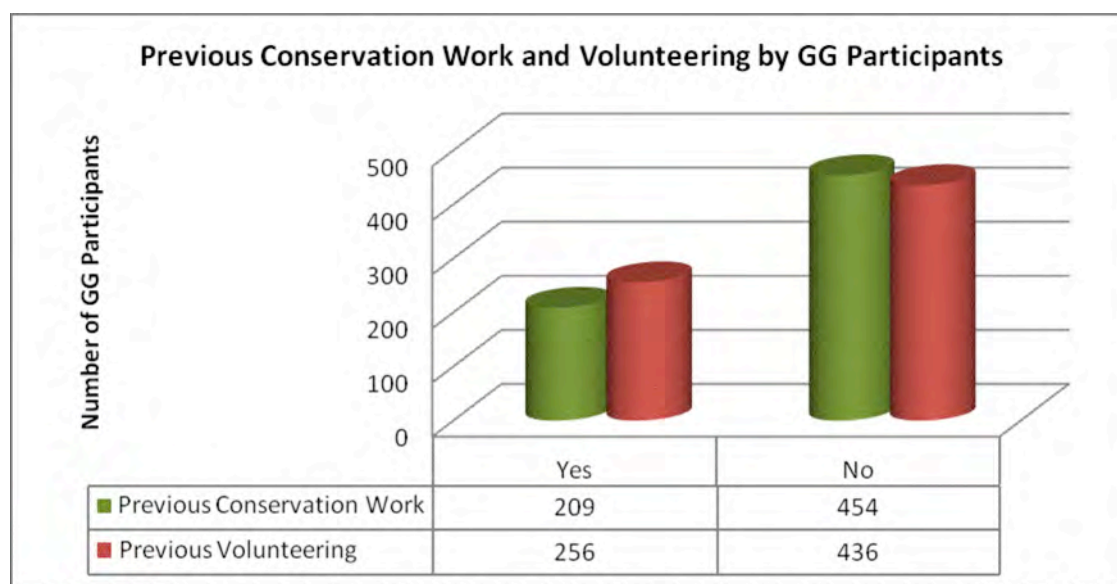


Figure 3:9 Previous conservation work and volunteering by GG participants

3.3.10: Motivation for Joining Green Gym

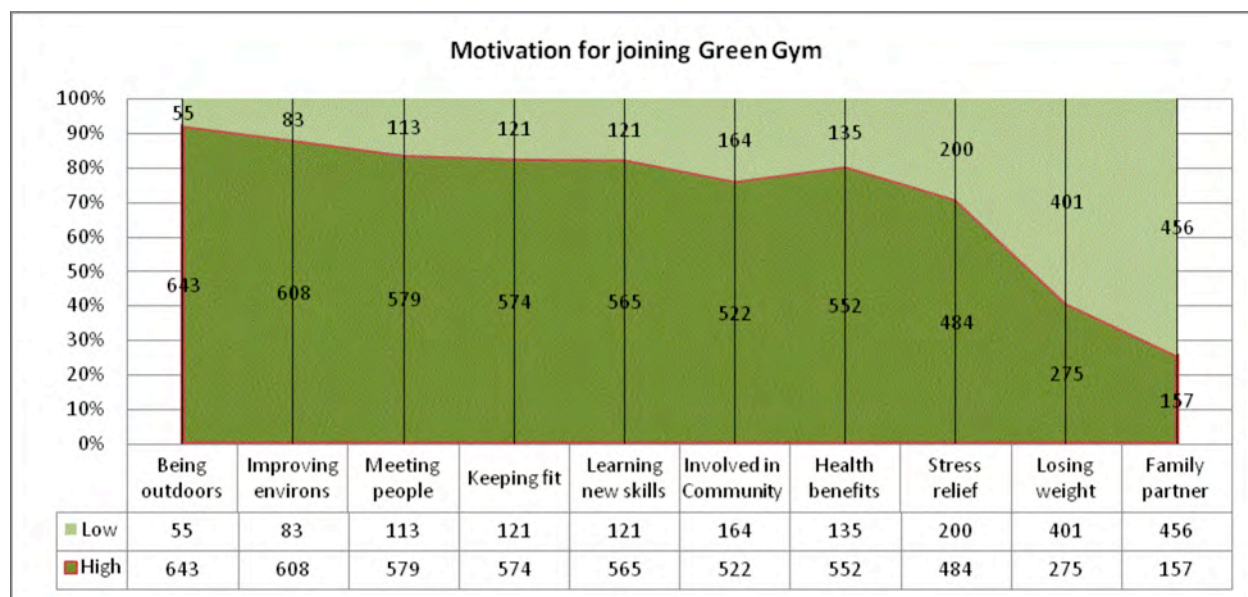


Figure 3:10 Motivation for joining Green Gym

Figure 3:10 shows how GG participants rated 10 reasons for joining a Green gym. In IQ (page three) ③ and ④ were scored as ‘high’ reason and ① and ② were scored as ‘low’ reason. For example, 643 GG participants rated ‘being outdoors’ as a ‘high’ reason for joining GG compared to 55 GG participants who rated it ‘low’. In **Figure 3:10**, 643 GG participants represents 92% of those who responded to ‘being outdoors’. In contrast only 41% of GG participants (275) rated ‘losing weight’ as a ‘high’ reason for joining GG, whereas 59% (401) GG participants rated it ‘low’. This pattern of responses has been consistent in all previous interim, national and local reports (Yerrell, from 2004, TCV unpublished reports).

3.3.11: SF12 - Physical Component Summary (PCS) Scores and the Mental Component Summary (MCS) Scores

SF36 ~ Short Form Health Status Survey

(Ware, Kosinski & Keller 1994)

Most widely used health survey

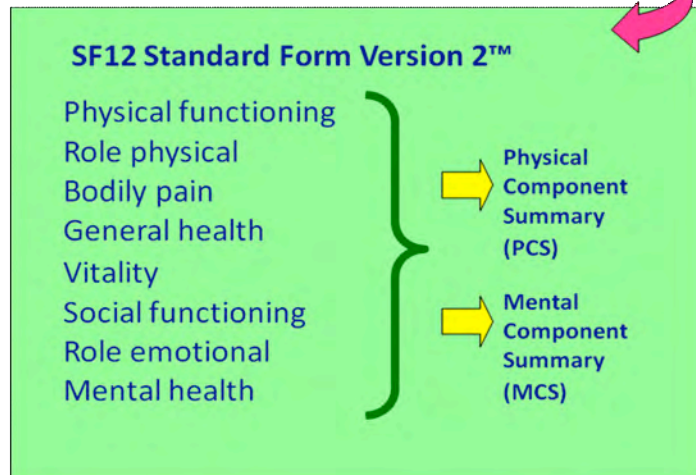


Figure 3:11 Summary of SF12 components and relation to SF36

The SF12 Physical Component Summary (PCS) Scores and the Mental Component Summary (MCS) Scores have been transformed to compare to the norms of a US national population (1998) and to have a Mean = 50 and Standard Deviation (SD) = plus/minus 10 (Ware *et al*, 2002). See also **Section Two: Method:** pages 15-16.

Standard deviation (SD) is a measure of the range of the distribution of Green Gym participants' Component Summary Scores about the mean.

You would expect approximately 70% of the scores to be between 40 (50 – 10) and 60 (50 + 10). Participants with scores below the mean (50) and particularly below 40 (<-1SD) might find their daily activities affected by their physical health or by their emotional health and well-being.

3.3.12: SF12 - Physical Component Summary (PCS) Scores

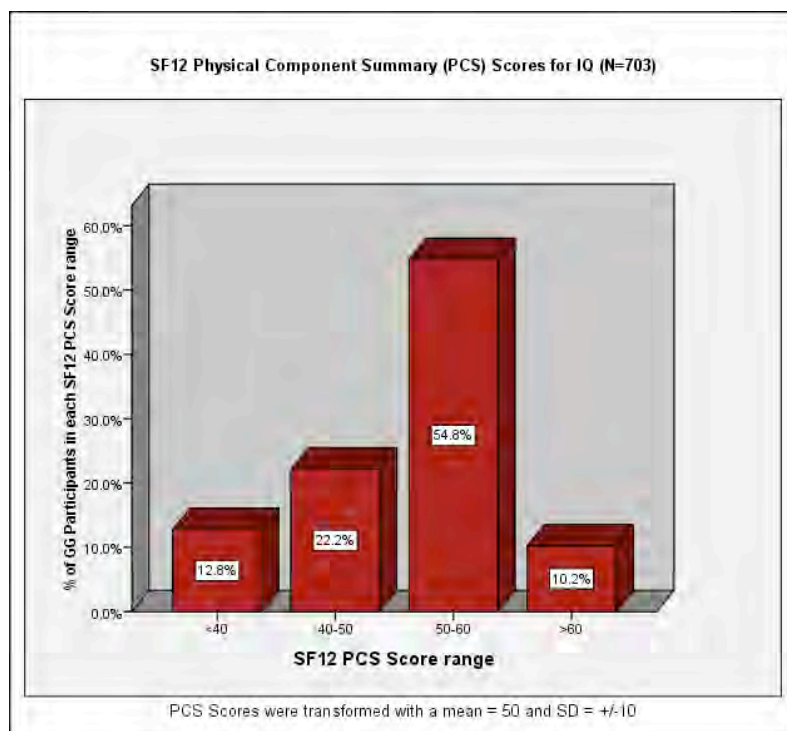


Figure 3:12 SF12 PCS Scores for IQ

Figure 3:12 shows the PCS Scores for IQ for 703 GG participants. The PCS Score range is divided into multiples of SDs: ≤ 40 ($< -1SD$; $[50 - n10]$, where $n = 2, 3, \dots$); $40 - 50$ ($-1SD$; $[50 - 10]$); $50 - 60$ ($+1SD$; $[50 + 10]$); > 60 ($> +1SD$; $[50 + n10]$, where $n = 2, 3, \dots$). For these PCS Scores 77% ($22.2 + 54.8$) fall between $\pm 1SD$ about the mean (50); as was noted above in a normal distribution approximately 70% of scores fall within this range. This suggests that the GG participants' PCS Scores are normally distributed (see **Figure 3:13**).

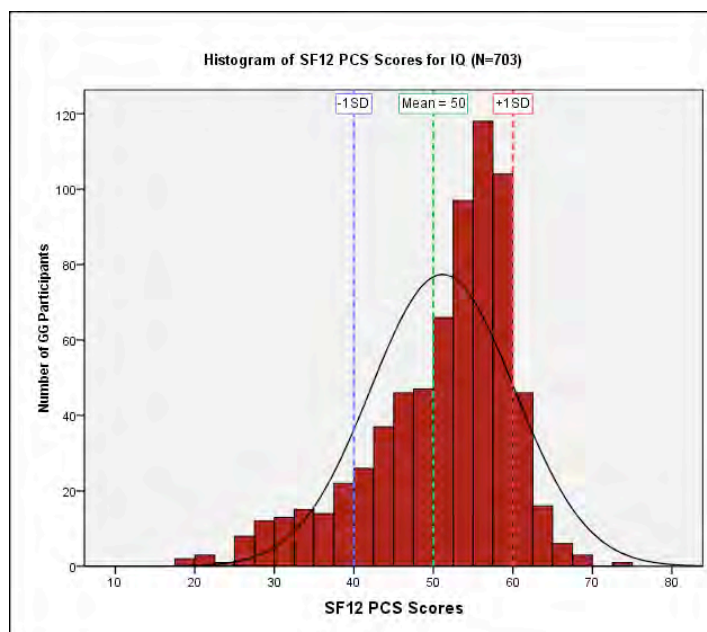


Figure 3:13 Histogram of SF12 PCS Scores for IQ

3.3.13: SF12 Mental Component Summary (MCS) Scores

Figure 3:14 shows the MCS Scores for IQ for 703 GG participants. Similarly to the PCS Scores, the MCS Score range is divided into multiples of SDs: <40 ($<-1SD$; $[50 - n10]$, where $n = 2, 3, \dots$); $40 - 50$ ($-1SD$; $[50 - 10]$); $50 - 60$ ($+1SD$; $[50 + 10]$); >60 ($>+1SD$; $[50 + n10]$, where $n = 2, 3, \dots$). For these MCS Scores 65.8% ($28.3 + 37.5$) fall between $\pm 1SD$ about the mean (50); as was noted above in a normal distribution approximately 70% of scores fall within this range. This suggests that the GG participants' MCS Scores are normally distributed (see **Figure 3:15**).

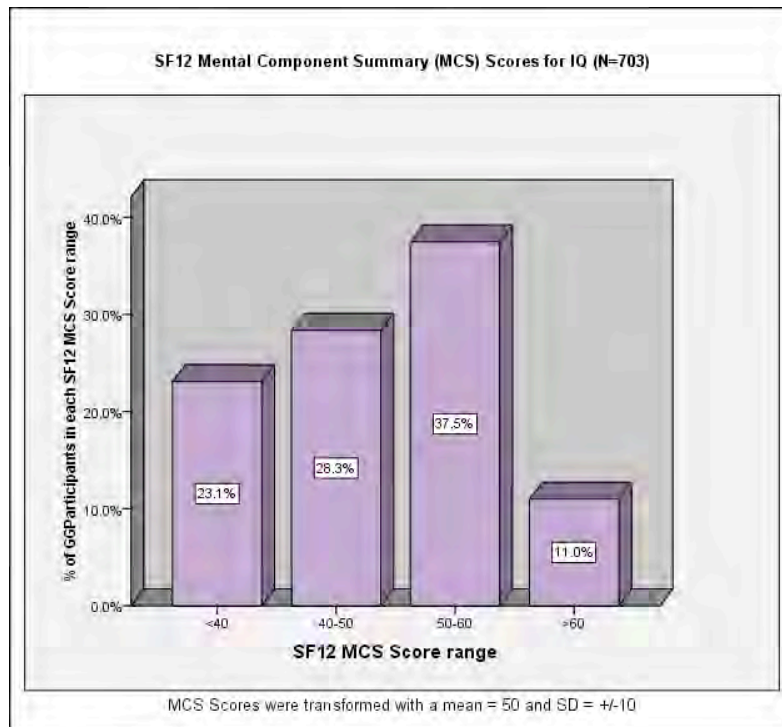


Figure 3:14 SF12 MCS Scores for IQ

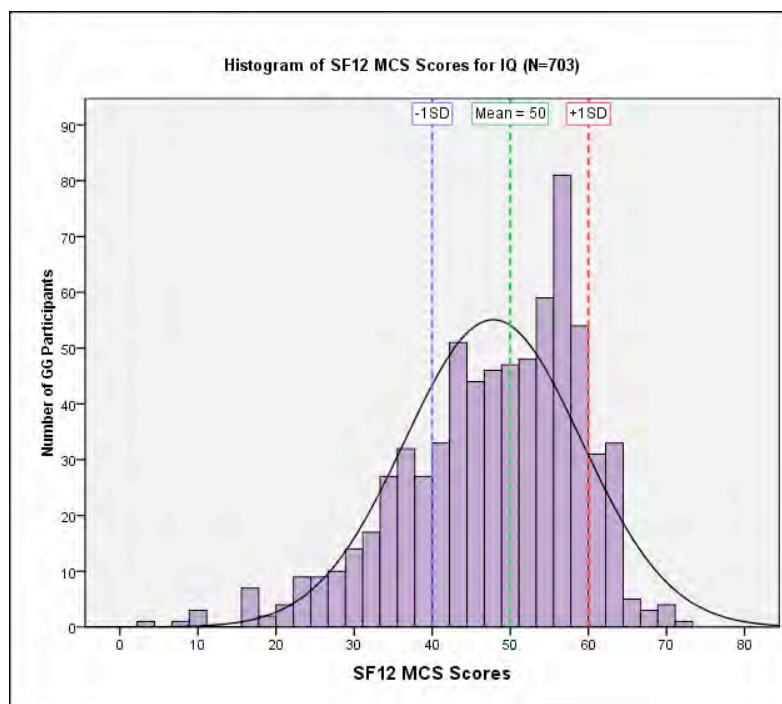


Figure 3:15 Histogram of SF12 MCS Scores for IQ

3.3.14: GP Visits

Figure 3:16 shows the number of visits, by GG participants to their GP, in the last four weeks, at the time of completing IQ. This question was added to the IQ at the second print-run, hence the number of responses (252 of 703 participants). Fifty-six percent (56%) of respondents made no visits and a further 29% only made one visit. By way of a contrast six percent of participants made three or more, up to 10, visits.

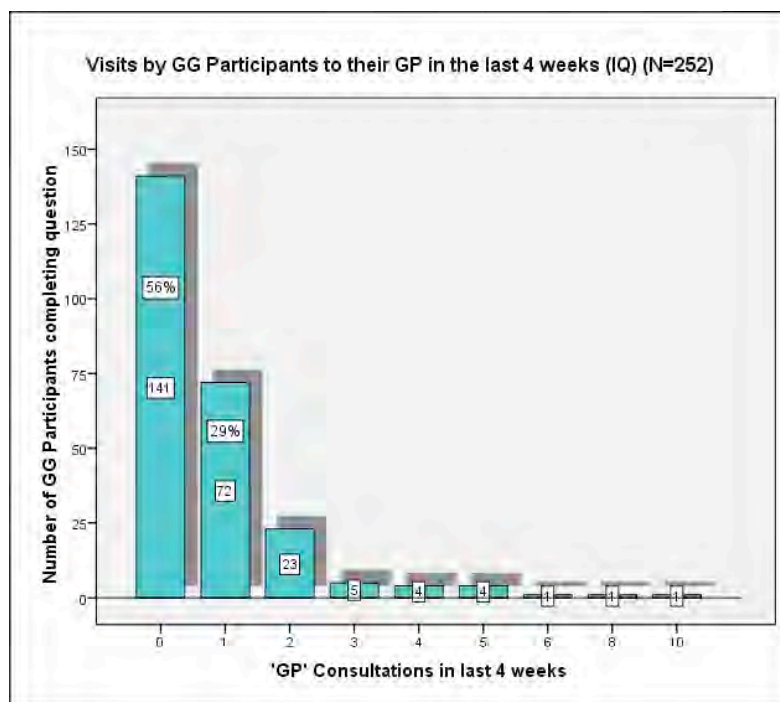


Figure 3:16 Visits by GG participants to their GP in the last four weeks for IQ

3.3.15: Activity Levels

Figure 3:17 shows the activity levels per week, at the time of completing the IQ, in METS. With a mean of 39 and standard deviation of 22, you would expect 70% of participants (287) to fall between 17 and 61 METs per week. Approximately 296 fall in this range.

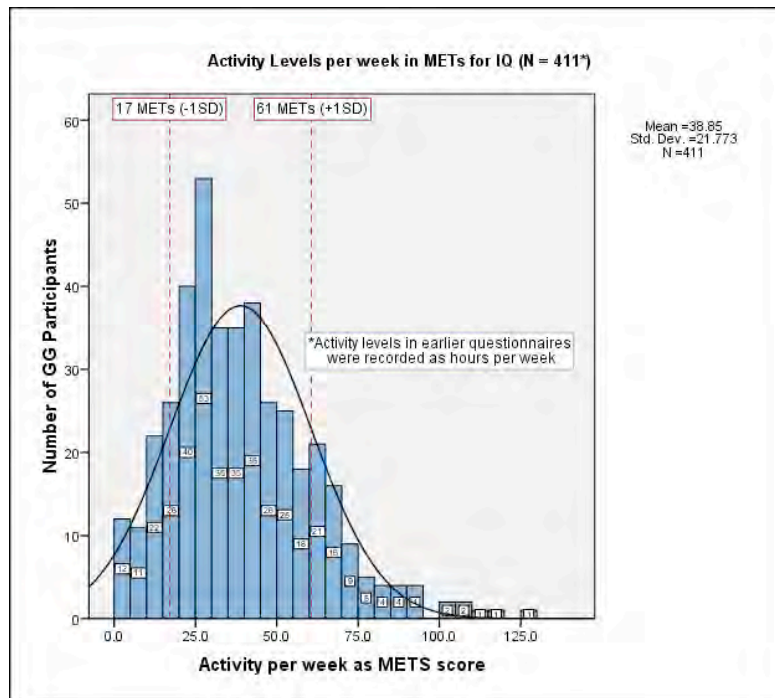


Figure 3:17 Histogram of Activity Levels per week for IQ

3.4: Continuation Questionnaire

A Continuation Questionnaire (CQ) was completed by 194 GG participants. The data from CQ were used, principally, to show differences in SF12 PCS and MCS Scores (PCS___ and MCS___), activity levels in METs (METs___) and the results of the 'Benefits of GG in the community' attitude scales in the three categories of 'health and confidence' of GG participants, 'skills and training' learnt or taught and 'contribution to the environment' by GG involvement.

3.4.1: Benefits of GG in the community

Figure 3:18 shows the attitudes of 173 GG participants who completed the Likert scale on 'benefits of GG in the community' in the CQ. Fourteen (14) statements were used and scored in three categories: Health and confidence; Skills and training; Contribution to the environment.

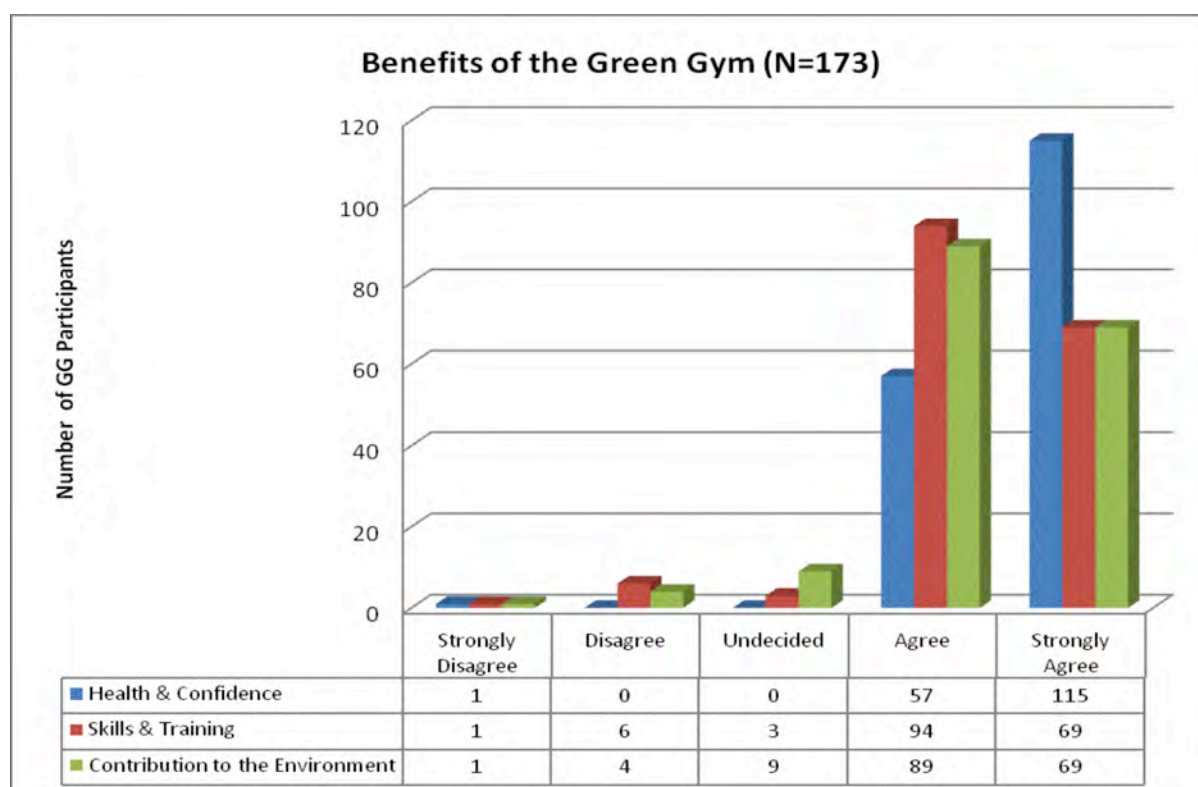


Figure 3:18 Benefits of Green Gym in the community

The greatest level of indecision or disagreement, to the positive statements on the benefits of GG, was in the 'contribution to the environment' category with eight percent (8%) of respondents being unsure or disagreeing. Overwhelmingly, GG participants 'agreed' or 'strongly agreed' with the statements in the three categories; 99%, 94% and 92%, respectively.

3.4.2: SF12 Physical Component Summary (PCS) and Mental Component Summary (MCS) Difference Scores: PCS___ and MCS___

The SF12 data were subjected to three statistical analyses: difference between means (paired samples t-test); linear regression (simple and multiple); and chi-square(___). All tests were undertaken using SPSS (Version 16) (Field, 2006).

3.4.3: SF12 PCS___ Difference Scores

3.4.3.1: Difference between means (paired samples t-test)

On average GG participants scored higher on SF12 PCS_ (Mean = 52.42, SE = 0.59) than on SF12 PCS_ (Mean = 51.55, SE = 0.63). This difference was significant $t(193df) = -1.73$, $p = .043$ (one-tailed), $r = 0.27$ (medium effect size). **Figure 3:19** shows error bar graph of adjusted PCS_ and PCS_ Scores (Field, 2006; pp279-285).

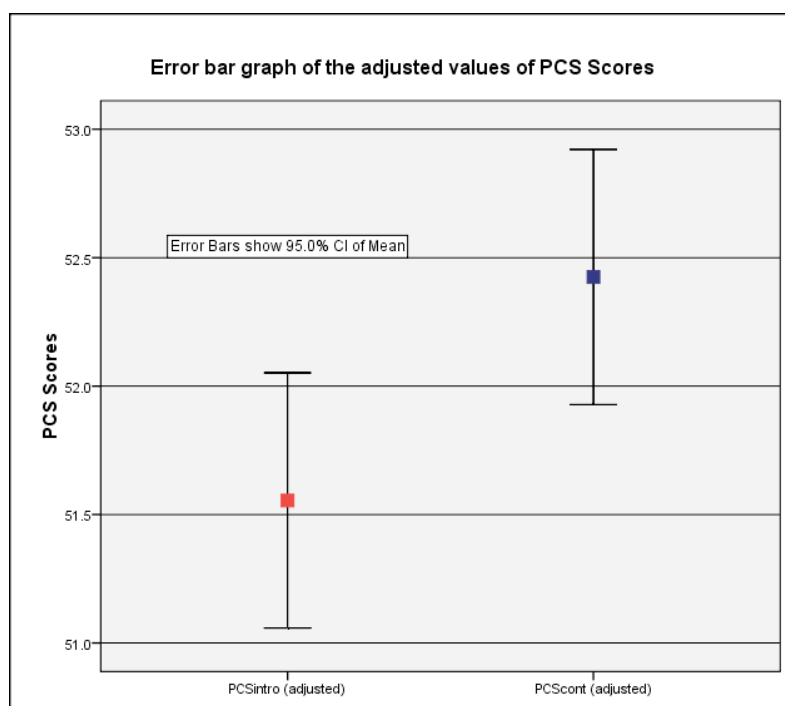


Figure 3:19 Error Bar Graph of Adjusted PCS Scores

3.4.3.2: Linear regression: PCS___ (Outcome) as predicted by PCS_ and Educational Level

The PCS data for 194 GG participants were analysed in a multiple linear regression using SPSS (version 16). MCS_ and Time-gap were not significant predictors of PCS__.

There was a significant linear relationship between PCS_ and PCS__ with regression coefficient -0.395 PCS_/PCS__ (95% CI -0.498 to -0.292), $p < 0.0001$. For every increase of 1.0 unit in PCS_, there is a decrease of -0.39 units in PCS__. In the model developed for regression 11 participant outliers ($PCS_ > 2SD$) were removed from the analysis, leaving 183 GG participants. **Figure 3:20** below shows all 194 GG participants.

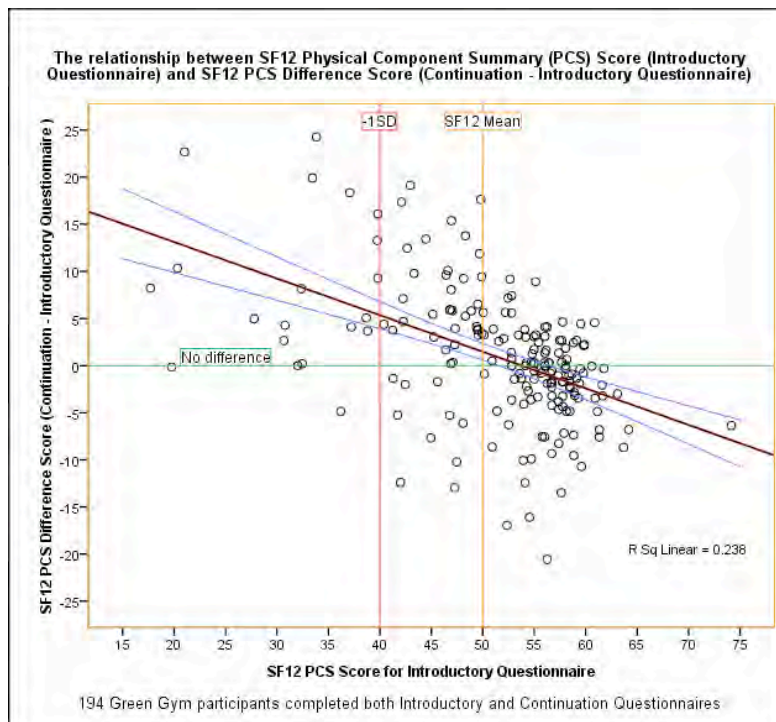


Figure 3:20 Linear regression of SF12 PCS__ as outcome, PCS_ as predictor

To explore the distribution of GG participants' scores for the above significant regression coefficient, two further graphs were plotted which separated those GG participants scoring ≤ 50 on the IQ and those scoring ≥ 50.01 . Fifty (50) is the mean of the transformed PCS scale scores and ± 10 is the standard deviation.

The number of GG participants scoring $PCS_ \leq 50$ and with a higher $PCS_$ score, making a positive $PCS_$, was 55. A positive $PCS_$ score indicates an improvement in their Physical Component Summary score. Those GG participants (with a $PCS_ \leq 50$) scoring a lower $PCS_$ score, making a negative $PCS_$ was 11 (see **Figure 3:21**).

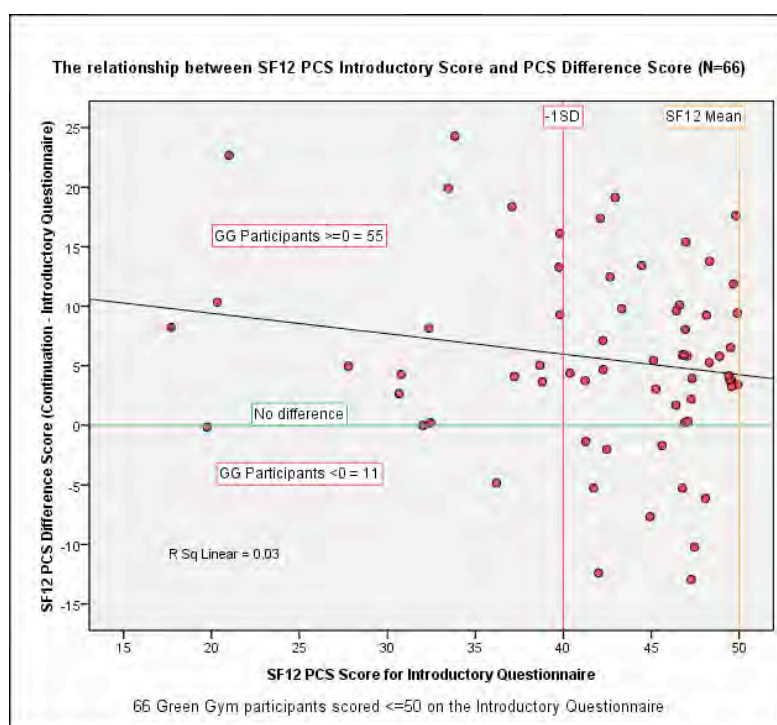


Figure 3:21 The relationship between PCS scores and PCS scores, when PCS ≤ 50

Figure 3:22 shows that the number of GG participants scoring PCS ≥ 50.01 and with a higher PCS score, making a positive PCS, was 46. A positive PCS score indicates an improvement in their Physical Component Summary score. Those GG participants scoring a lower PCS score, a reduction in their Physical Component Summary score, making a negative PCS was 82.

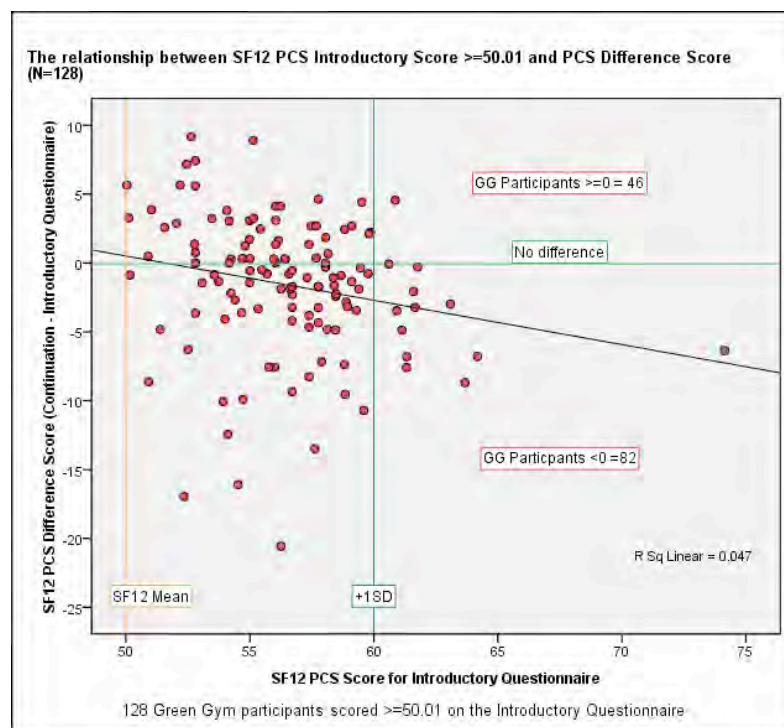


Figure 3:22 The relationship between PCS scores and PCS scores, when PCS ≥ 50.01

Table 3:3 summarises these 'changes':

| | PCS_Lower | PCS_Higher | Total |
|-------------------|-----------|------------|-------|
| PCS_ ≤ 50 | 11 | 55 | 66 |
| PCS_ ≥ 50.01 | 82 | 46 | 128 |
| Total | 93 | 101 | 194 |

Table 3:3 Summary of relationship between PCS scores when $50.01 \geq \text{PCS} \leq 50$

There was a significant association between PCS_ scores and GG participants PCS_ scores increasing or reducing __ (1) = 37.89; based on the odds ratio, participants with a PCS_ ≥ 50.01 are 8.9 times more likely to get a lower PCS_ score OR participants with a PCS_ ≤ 50 are 8.9 times more likely to get a higher PCS_ score.

The implications of these three statistical analyses: difference between means (paired samples t-test); linear regression (simple and multiple); and chi-square(__), will be considered in

Section Four: Discussion.

One further simple linear regression is worthy of mention; SF12 PCS____ as outcome 'Educational Level' as predictor variable.

There was a significant linear relationship between 'Educational Level' (EL) and PCS____ with regression coefficient 1.08 EL/PCS____ (95% CI 0.511 to 1.657), $p < 0.0001$. For every increase of 1.0 unit in EL, there is an increase of 1.08 units in PCS____. **Figure 3:23** below shows the regression line for 191 GG participants.

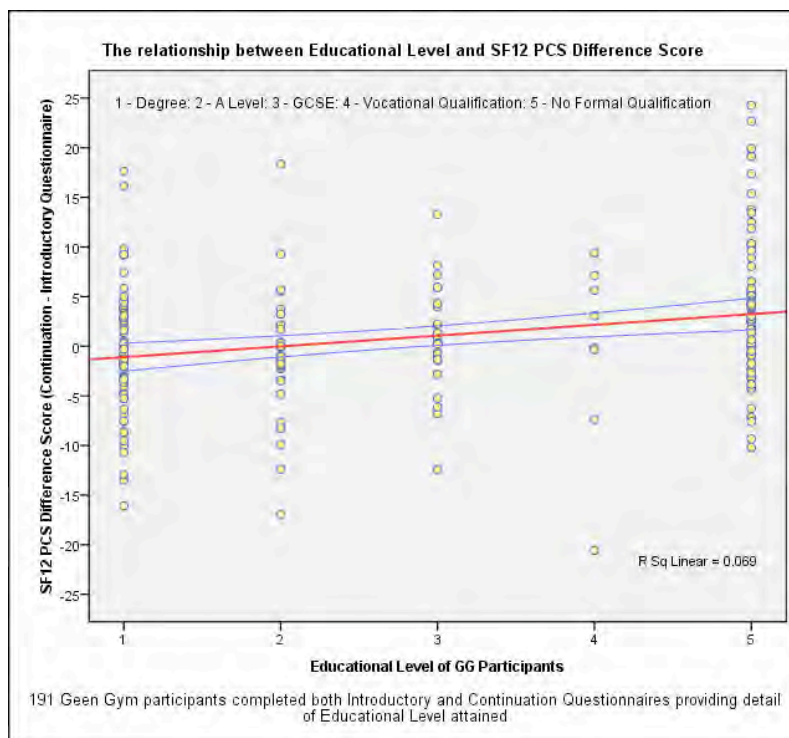


Figure 3:23 The relationship between PCS____ scores as outcome, 'Educational Level' as predictor variable

3.4.4: SF12 MCS____ Difference Scores

3.4.4.1: Difference between means (paired samples t-test)

On average GG participants scored lower on SF12 MCS_ (Mean = 48.50, SE = 0.73) than on SF12 MCS_ (Mean = 50.17, SE = 0.73). This difference was significant $t(193df) = 2.34$, $p = .011$ (one-tailed), $r = 0.17$ (small effect size). **Figure 3:24** shows error bar graph of adjusted MCS_ and MCS_ Scores (Field, 2006; pp279-285).

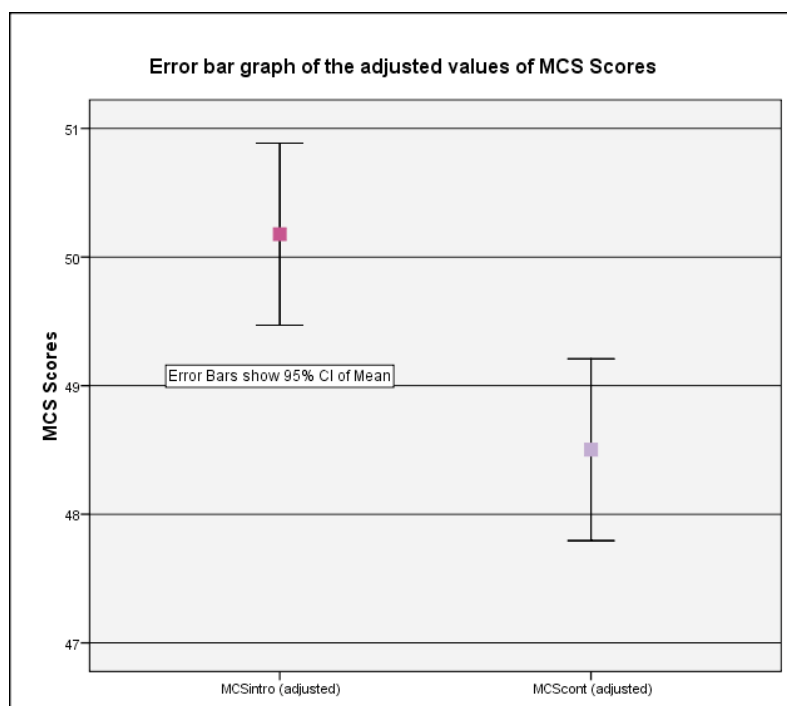


Figure 3:24 Error Bar Graph of Adjusted MCS Scores

3.4.4.2: Linear regression: MCS___ (Outcome) as predicted by MCS_ and PCS_

The MCS data for 194 GG participants were analysed in a multiple linear regression using SPSS (version 16). Time-gap was not a significant predictor of MCS___.

There was a significant linear relationship between MCS_ and MCS___ with regression coefficient -0.473 MCS_/MCS___ (95% CI -0.598 to -0.347), $p < 0.0001$. For every increase of 1.0 unit in MCS_, there is a decrease of -0.47 units in MCS___. In the model developed for regression 11 participant outliers ($PCS_ > 2SD$) were removed from the analysis, leaving 183 GG participants. **Figure 3:25** below shows all 194 GG participants.

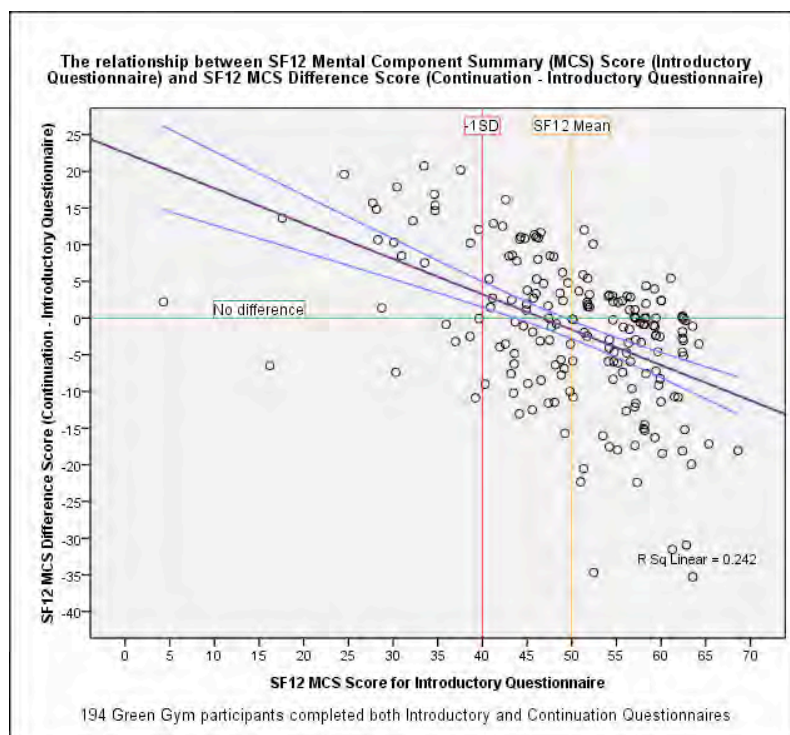


Figure 3:25 Linear regression of SF12 MCS as outcome, MCS as predictor

Furthermore, there was a significant linear relationship between PCS_ and MCS___ with regression coefficient +0.212 PCS_/MCS___ (95% CI 0.067 to 0.357), $p = 0.004$. For every increase of 1.0 unit in PCS_, there is an increase of +0.21 units in MCS___. In the model developed for regression 11 participant outliers ($PCS_ > 2SD$) were removed from the analysis, leaving 183 GG participants. **Figure 3:26** below shows all 194 GG participants.

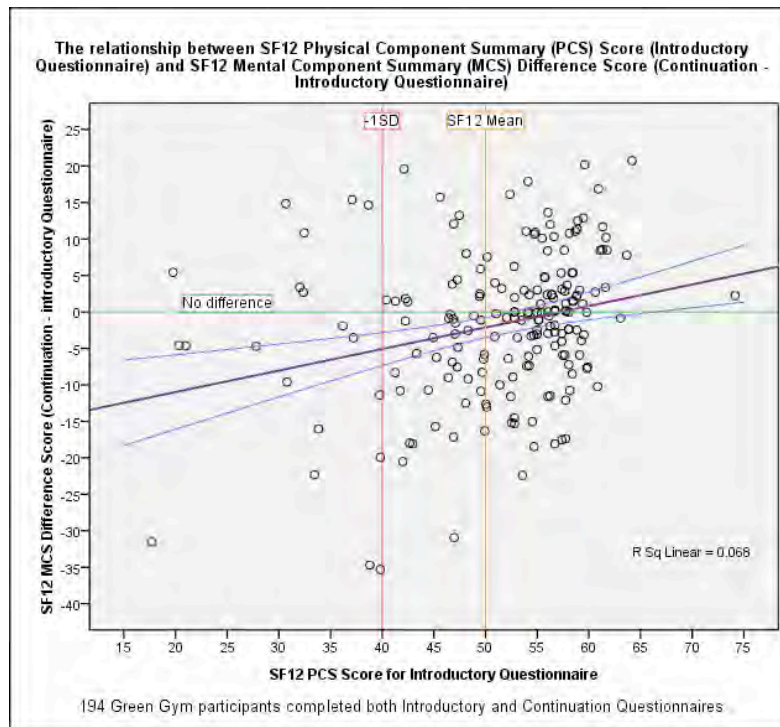


Figure 3:26 Linear regression of SF12 MCS as outcome, PCS as predictor

To explore the distribution of GG participants' scores for the above significant regression coefficient (MCS___ as outcome, MCS_ as predictor; **Figure 3:25**), two further graphs were plotted which separated those GG participants scoring ≤ 50 on the IQ and those scoring ≥ 50.01 . Fifty (50) is the mean of the transformed MCS scale scores and ± 10 is the standard deviation.

The number of GG participants scoring MCS_ ≤ 50 and with a higher MCS_ score, making a positive PCS___, was 54. A positive MCS___ score indicates an improvement in their Mental Component Summary score. Those GG participants scoring a lower MCS_ score, making a negative MCS___ was 32 (see **Figure 3:27**).

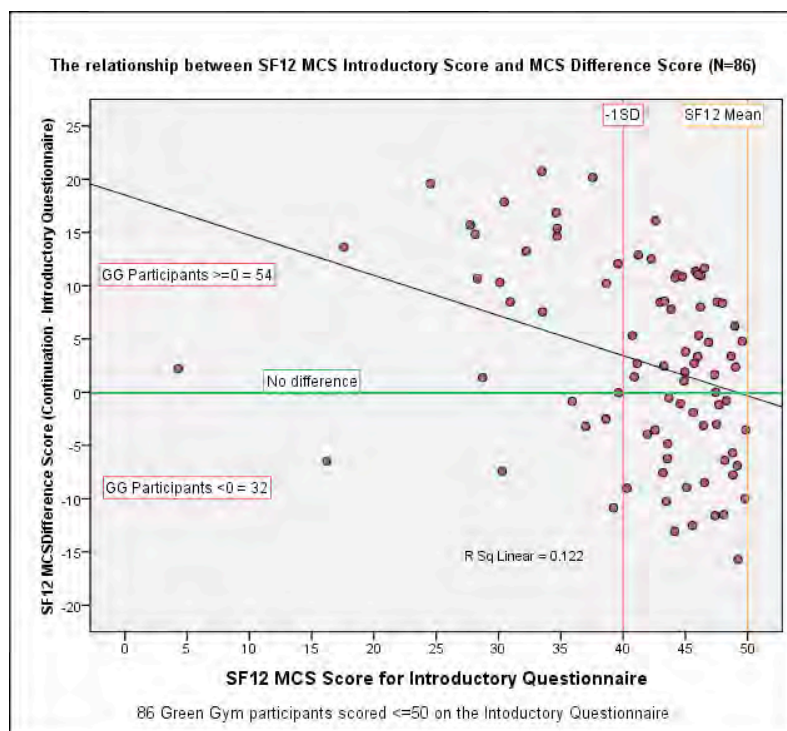


Figure 3:27 The relationship between MCS scores and MCS scores, when MCS ≤ 50

Figure 3:28 shows that the number of GG participants scoring MCS ≥ 50.01 and with a higher MCS score, making a positive MCS, was 26. A positive MCS score indicates an improvement in their Mental Component Summary score. Those GG participants scoring a lower MCS score, a reduction in their Mental Component Summary score, making a negative MCS was 82.

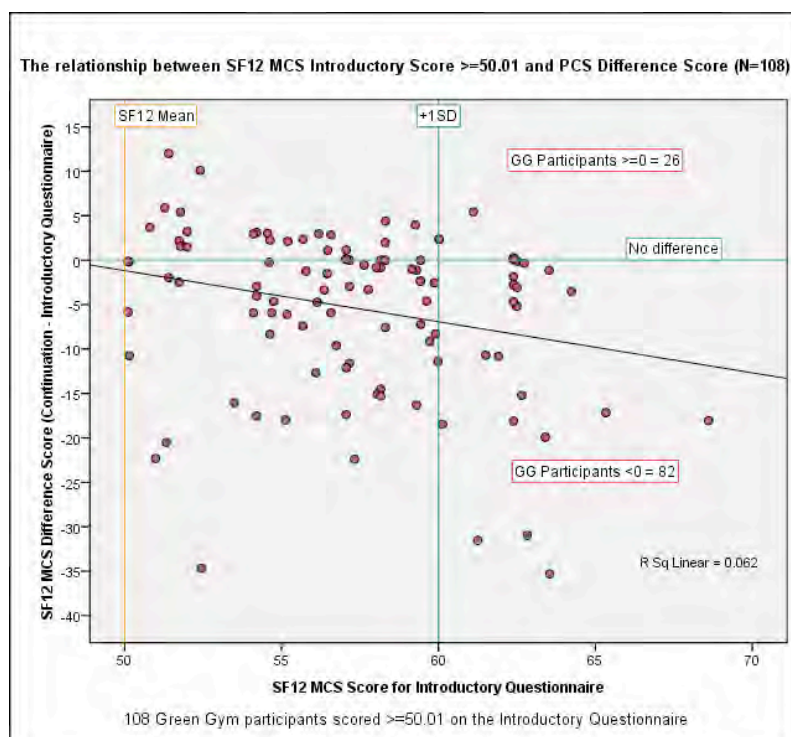


Figure 3:28 The relationship between MCS₁ scores and MCS₂ scores, when MCS₁ ≥ 50.01

Table 3:4 summarises these 'changes':

| | MCS ₁ Lower | MCS ₁ Higher | Total |
|-------------------------------|------------------------|-------------------------|-------|
| MCS ₂ ≤ 50 | 32 | 54 | 86 |
| MCS ₂ ≥ 50.01 | 82 | 26 | 108 |
| Total | 114 | 80 | 194 |

Table 3:4 Summary of relationship between MCS₁ scores when $50.01 \geq \text{MCS}_1 \leq 50$

There was a significant association between MCS₁ scores and GG participants MCS₂ scores increasing or reducing __ (1) = 28.04; based on the odds ratio, participants with a MCS₁ ≥ 50.01 are 2.5 times more likely to get a lower MCS₂ score OR participants with a MCS₁ ≤ 50 are 2.5 times more likely to get a higher MCS₂ score

The implications of these three statistical analyses: difference between means (paired samples t-test); linear regression (simple and multiple); and chi-square(__), will be considered in

Section Four: Discussion.

3.4.5: Activity levels in Metabolic Equivalent Tasks (METs; METs___)

3.4.5.1: Difference between means (paired samples t-test)

On average GG participants scored higher on METs_ (Mean = 43.37, SE = 1.44) than on METs_ (Mean = 41.52, SE = 1.66). This difference was not significant $t(189df) = -1.317$, $p = .095$ (one-tailed), $r = 0.095$ (small effect size). **Figure 3:29** shows error bar graph of adjusted METs_ and METs_ Scores (Field, 2006; pp279-285).

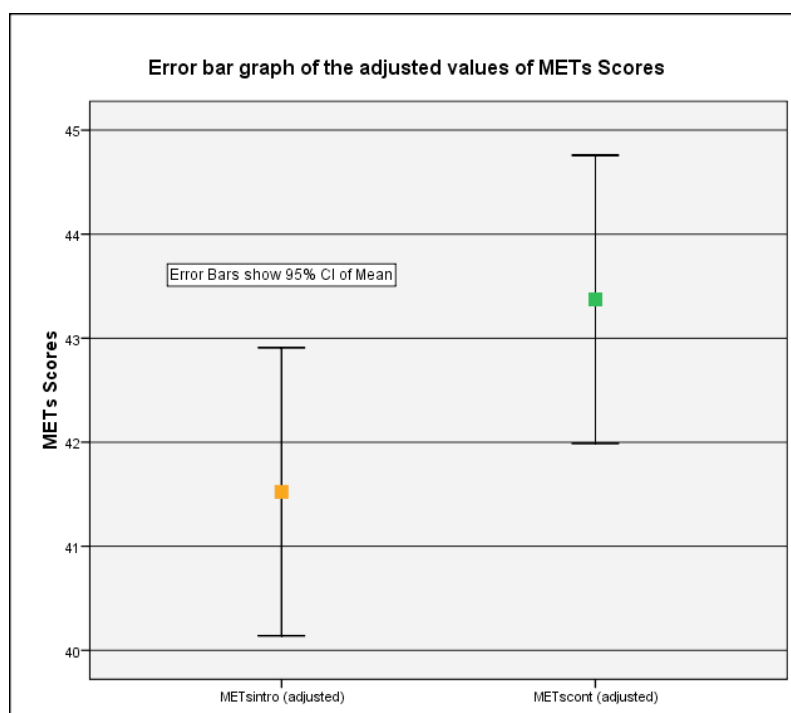


Figure 3:29 Error Bar Graph of Adjusted METs Scores

3.4.5.2: Linear regression: METs___ (Outcome) as predicted by METs_

The METs data for 190 GG participants were analysed in a simple linear regression using SPSS (version 16).

There was a significant linear relationship between METs_ and METs___ with regression coefficient -0.484 METs_/METs___ (95% CI -0.584 to -0.384), $p < 0.0001$. For every increase of 1.0 unit in METs_, there is a decrease of -0.48 units in METs___. **Figure 3:30** below shows regression line for 190 GG participants.

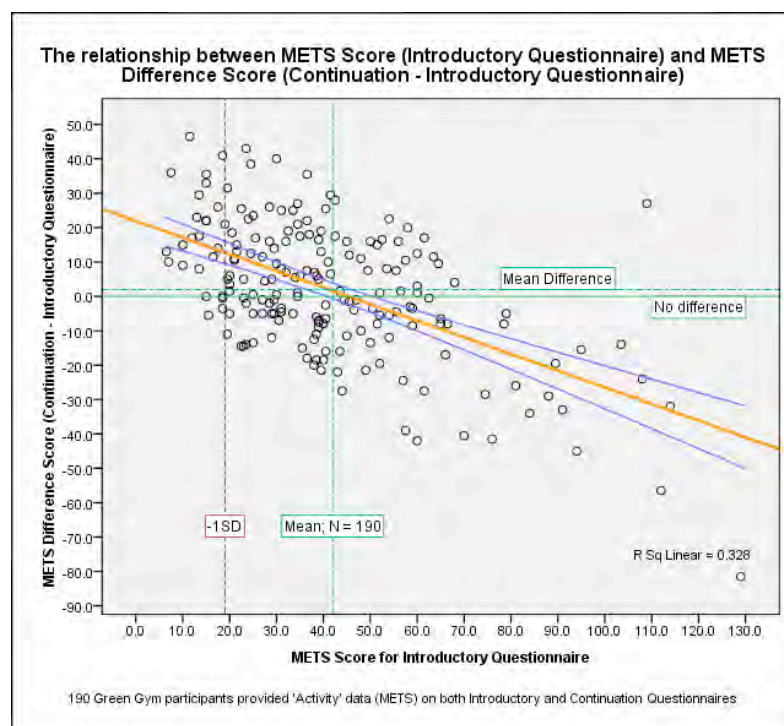


Figure 3:30 Linear regression of METs___ as outcome, METs___ as predictor

To explore the distribution of GG participants' scores for the above significant regression coefficient (METs___ as outcome, METs___ as predictor), further descriptive statistics were calculated which separated GG participants as follows:

- Scores \leq [METs___ Mean] and scores $>$ [METs___ Mean] on the IQ
- Scores \leq [METs___ Mean] and scores $>$ [METs___ Mean].

The mean of the METs___ scores was 41.52. The mean of the METs___ scores was 1.85.

Table 3:5 summarises these 'separations':

| | METS___ $>$ [METs___ Mean] | METS___ \leq [METs___ Mean] | Total |
|---------------------------|----------------------------|-------------------------------|-------|
| METS_ $>$ [METs_ Mean] | 23 | 51 | 74 |
| METS_ \leq [METs_ Mean] | 70 | 46 | 116 |

| | | | |
|-------|----|----|-----|
| Total | 93 | 97 | 190 |
|-------|----|----|-----|

Table 3:5 Summary of relationship between METs_ and METs_ scores and their means

There was a significant association between METs_ scores and GG participants METs____ scores, ____ (1) = 14.33; based on the odds ratio, participants with a METs_ <= [METs_ Mean] are 3.4 times more likely to get a METs____ score higher than METs____ Mean OR participants with a METs_ > [METs_ Mean] are 3.4 times more likely to get a METs____ score lower than METs____ Mean.

The implications of these three statistical analyses: difference between means (paired samples t-test); linear regression (simple); and chi-square(____), will be considered in ***Section Four: Discussion.***

In summary, three statistical procedures have been applied to explore the differences and relationships between SF12 scores, activity levels and the 'sub-groups' of 194 GG participants that have provided data for such analyses.

4.0: Section Four - Discussion

4.1: Content

This Section will provide:

- A *profile of GG participants* incorporating their attitudes and performance, including SF12 and activity levels (METs) as measured by IQ. The profile will also incorporate the perceived '*Benefits of GG in the Community*' as recorded in CQ
- Consideration of the data from both *IQ and CQ measures* in relation to changes in health status (SF12) and to changes in activity levels (METs)

4.2: Profile of GG Participants

This update, on previous unpublished reports, of the profile of GG participants, once again demonstrates the diversity of project members and how GG is inclusive in its 'recruitment'.

The one exception to this pattern is questionnaire returns from minority ethnic groups, currently 97% of respondents are 'white'. Although minority ethnic members exist, there are few questionnaire returns from these groups even though Project Leaders were offered the option of translating questionnaires should this have been seen as a factor in non-completion. An Asian women's group in Yorkshire is an example in this respect. It is important to note here that this figure does match with TCV's Management Information System (MIS) figures for Black and Minority Ethnic (BME) groups. BME participants of GGs nationally is 14.2% of total GG membership compared to a figure of BME citizens in national population of 7.9% (TCV MIS – UK statistics 8th May 2008; 2001 Census).

4.2.1: Age

Approximately 80% of GG participants fall within four (4) age bands (25-34; 35-44; 45-54; 55-64) with 19% per band. The lower band from 18-24 and the 65-75+ make up the remaining 20%. Local reports show variation in this pattern, which relates to location, self-sustaining status, including duration of projects, and recruitment patterns (see 'Where did you hear about GG?'; page 28).

This inclusive profile will be supplemented by the data from an evaluation of the School Green Gym, which is currently being piloted (TCV, from 2007).

4.2.2: Gender, Marital Status, Accommodation, Educational Level and Employment Status of GG Participants

Males represent around 60% of GG participants. This is reflected in all age groups except for the 55-64 band where a 6:5 male/female participant ratio was recorded.

Males also represent about two-thirds of the 'living alone' categories. **Figure 4:1** shows the marital status for each age band. It is only in the 55-64 and 65-74 bands that 'being married' or 'living with partner' exceeds 'being single/living alone'

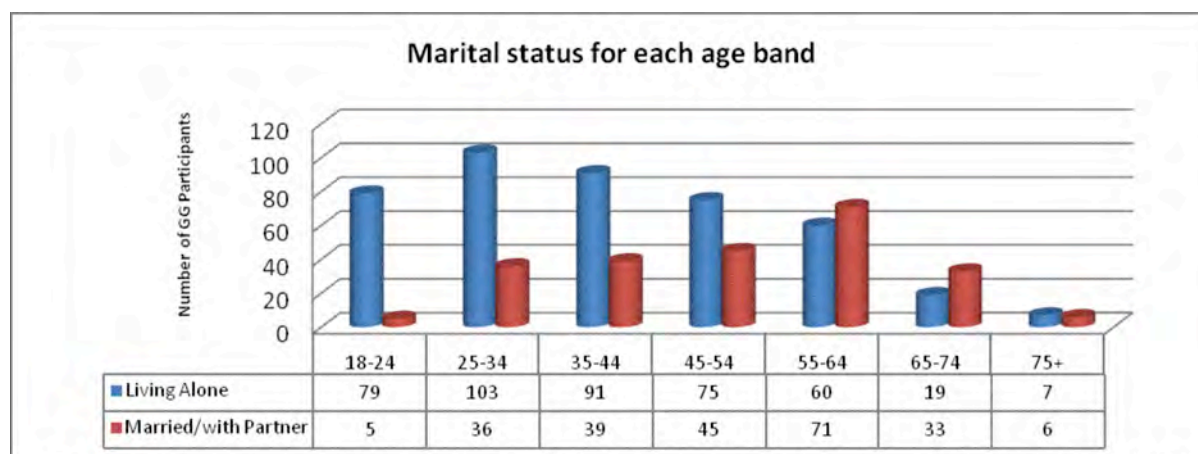


Figure 4:1 Marital status for age bands of GG participants

These patterns of gender and marital status probably reflect not only the 'exercise factor' in recruitment or recruiting recommendations but also the benefits of the 'social factor' of focussed team work.

Perhaps not surprisingly, 75% of GG participants that fall into the 55-64 age band and who are married or living with a partner are owner-occupiers.

Over 45% of married GG participants have a degree, compared to 55% of single members. Eighty-two percent (82%) of GG participants, who have no formal qualifications, are single (see **Figure 4:2**).

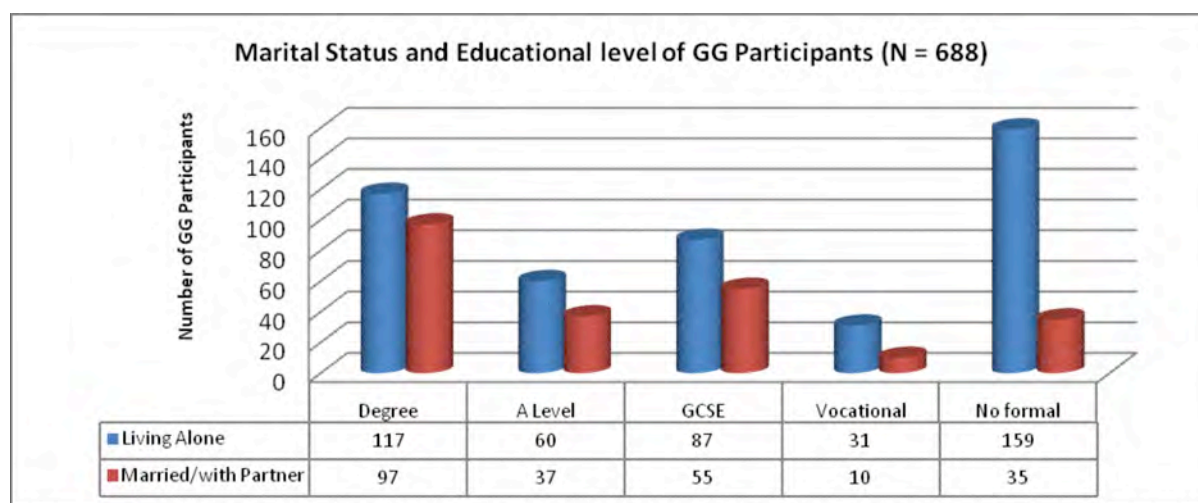


Figure 4:2 Marital status and educational level of GG participants

Of the 219 GG participants responding to the second print-run question on employment, 71% were unemployed or retired. Eighty-two percent (82%) of GG participants with no formal qualifications were unemployed.

These selected statistics relating to marital status, accommodation, educational level and employment status of GG participants point to two distinct communities within the GG participants: educated, married owner-occupiers and those with no formal qualifications who are unemployed and are single.

Such distinctions raise issues relating to the expectations of health and social care organisations recommending clients to join Green Gyms and the perceived role of GG Project Leaders in facilitating the well-being of participants through green exercise. This potential ‘nonspread’ (Ferlie, Fitzgerald, Wood & Hawkins, 2005) between the social and cognitive infrastructures of the health and social care organisations, on the one hand, and the concept of Green Gym, on the other is discussed later in this *Section* following discussion of the differences in measure scores between the two questionnaires.

4.2.3: Where did you hear about Green Gym?

Three types of sources of information were identified (see **Figure 3:8**; page 28) by GG participants (N = 564): word of mouth from colleague; communication through organisations or media; and health and social care provision. Local GG projects varied in the way participants were ‘directed’ to them.

Word of mouth from colleague was identified by 15% of participants; communication through organisations or media constituted 49% of responses; and health and social care provision, including community facilities, day centres and job centres made up the remaining 36%.

Figure 4:3 (Four Charts) show the distribution (%) of these sources for GG participants who scored above (> 50) and below (< 50) the mean for SF12 PCS and MCS scores. Whilst word of mouth remains relatively constant across all four charts, the patterns of 'referrals' from health and social care vary; the lower SF12 scores the higher the percentage of referrals.

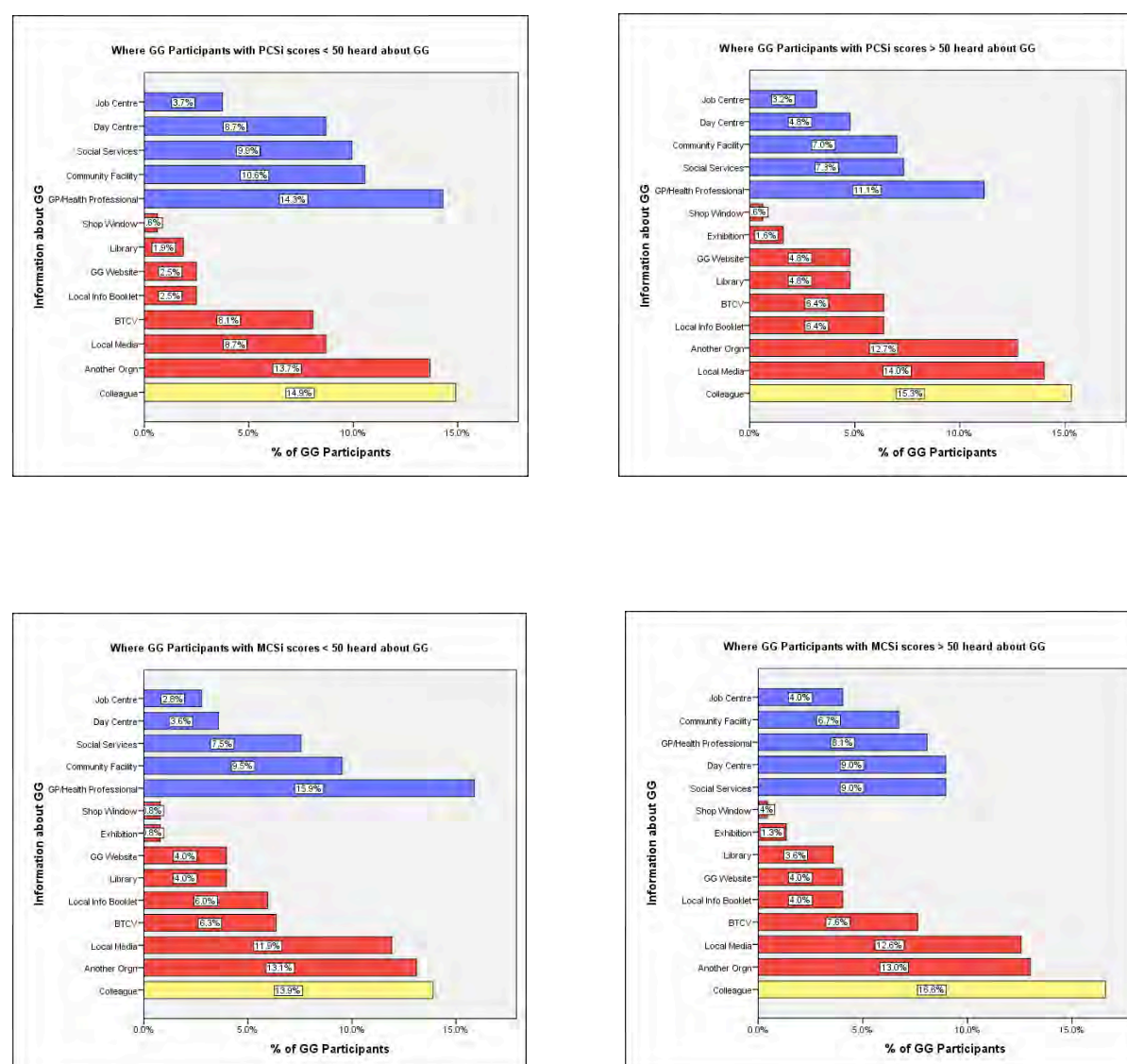


Figure 4:3 Four charts showing where GG participants heard about GG

This can be seen more clearly in **Figure 4:4**, where the bands for sub-categories of organisation/media and health and social care have been combined in a bar-chart.

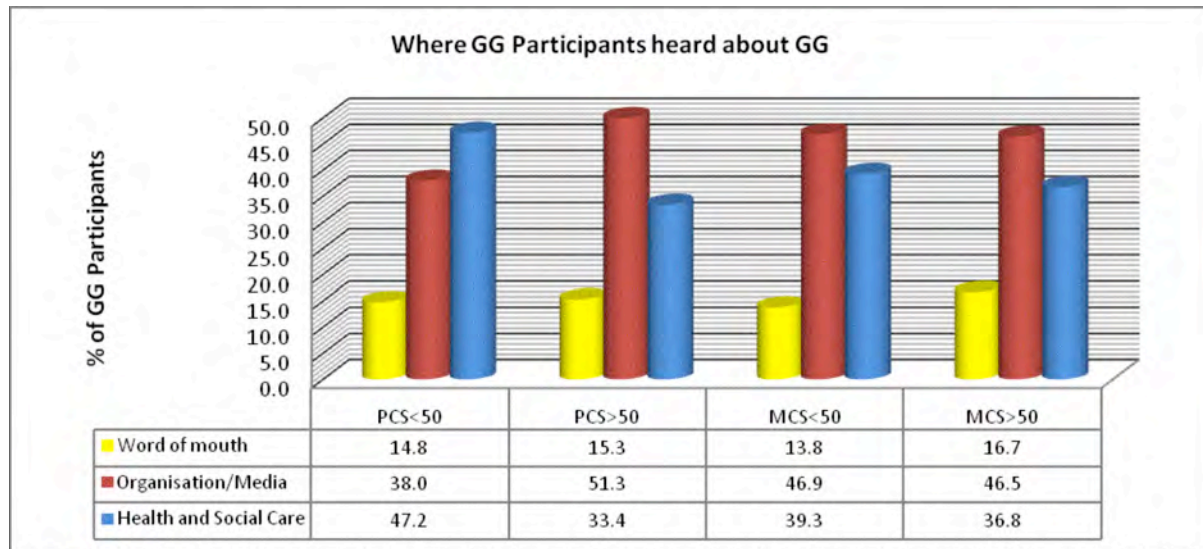


Figure 4:4 Bar charts showing where GG participants heard about GG

In **Figure 4:5**, sources of information about GG, Health and social care referrals have been highlighted. Here, the decrease in referrals for PCS scores is 13.8% and for MCS scores 2.5%. Even this differential suggests that the expectations of the therapy of green exercise by health and social care professionals vary in relation to 'depressed' measures of well-being, whether physical or mental.

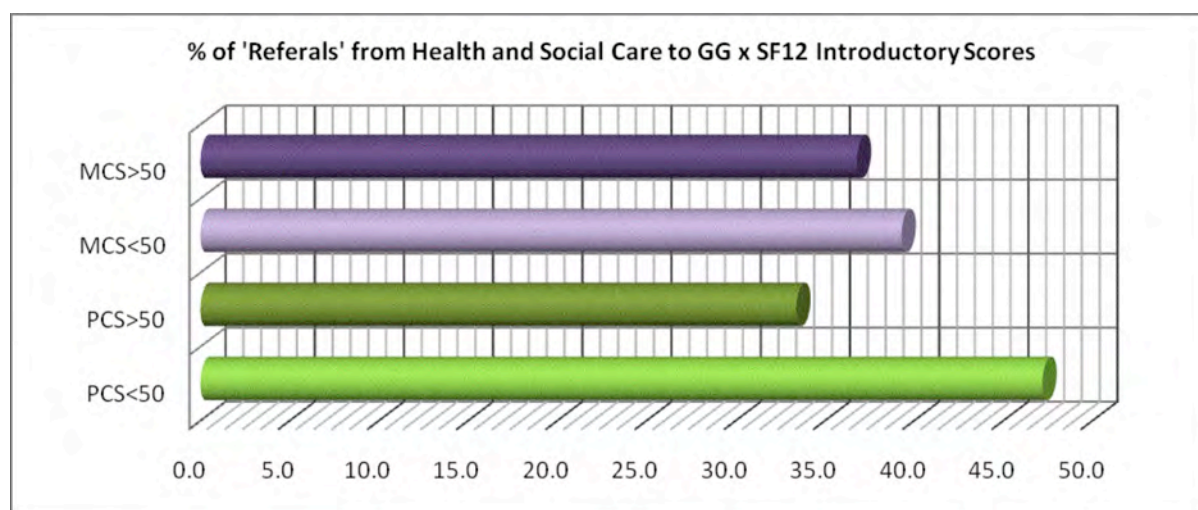
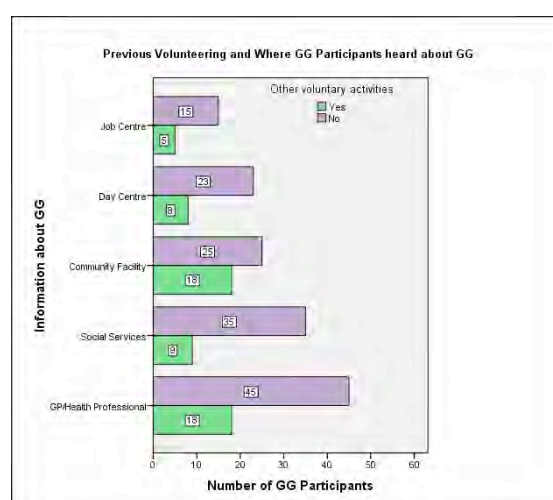
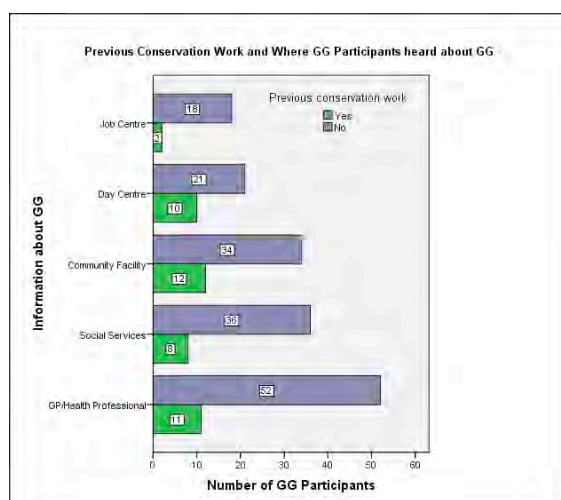


Figure 4:5 Bars of 'Referrals' from health and social care x SF12 Introductory scores

4.2.4: Previous Conservation Work and Volunteering

Given the host organisation for the Green Gym is TCV (formerly known as British Trust for Conservation Volunteers), recruiting new members to volunteering and conservation are principal aims. However, it is not clear how the process of 'referrals' sits with these parameters. Do you voluntarily do conservation work, with the knowledge it will benefit yourself as well as the environment and community, when you are 'referred' by a health professional? Whatever the answer(s) to this question, only 37% of GG participants had volunteered, in the 'non-referral' sense, and only 32% conserved before joining the GG. Interestingly, in respect of the above question, only 18% of GG participants, who heard about GG from their GP or health professional had undertaken conservation work before; similarly only 28% had previously 'volunteered'. **Figure 4:6** shows similar data for other information sources in the health and social care cluster.



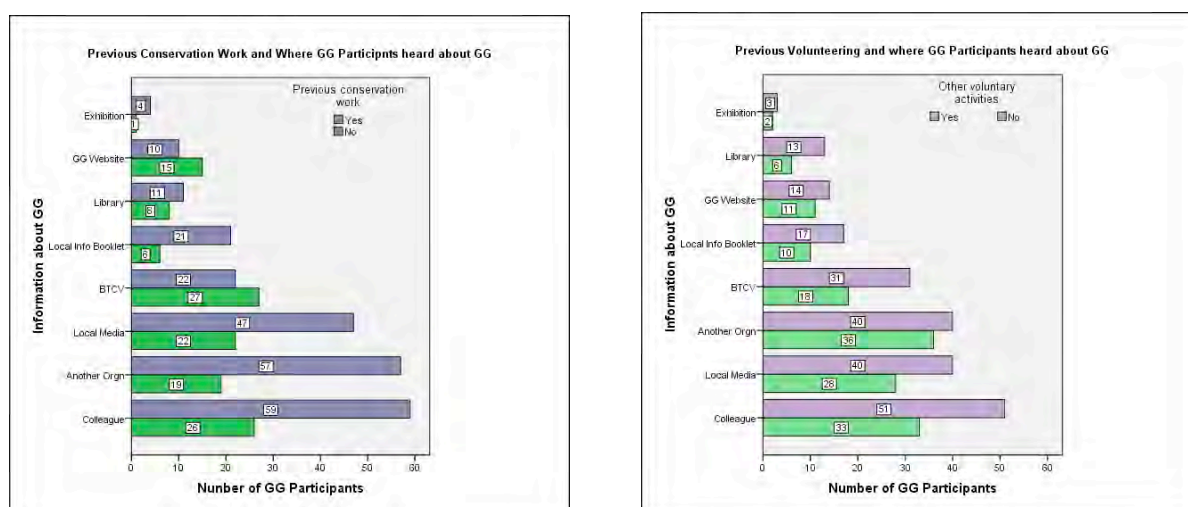


Figure 4:6 Where GG participants heard about GG and previous conservation and volunteering experience

By contrast, the 'yes to previous conservation' and 'yes to previous volunteering' numbers in the non-health and social care cluster are, generally, a greater proportion of the total numbers of GG participants hearing about GG from such sources. Importantly, here, the GG Website and TCV are providing a more likely source of information for previous conservationists than for previous volunteers.

4.2.5: Motivation for Joining Green Gym

Figure 3:10 (page 29) shows GG participants' high-low factors for joining GG. The two factors most highly rated are '*Being outdoors*' and '*Improving the environment*'; the lowest rated factors being '*Losing weight*' and '*Being with family or partner*'. Given 66% of GG participants are 'single', it is perhaps the case that this factor is merely not relevant to a large proportion of project members.

Eight (8) of the 10 factors were rated as high motivation factors for joining GG by greater than 70% of GG participants. These findings are consistent with those from the *Benefits of GG in the community* attitude survey, which formed part of the Continuation Questionnaire.

Here, overwhelmingly, GG participants 'agreed' or 'strongly agreed' with the statements in the three categories, 'Health and confidence', 'Skills and training', 'Contribution to the environment'; 99%, 94% and 92%, respectively. The statements in the Likert scale, to which such high agreement has been indicated, reflect both a sense of personal achievement and positive self-worth, alongside an appreciation of the political, managerial and bio-diversity aspects of conservation work in the local environment. Motivations for joining are fulfilled by being a member of a GG project.

4.2.6: SF12 - Physical Component Summary (PCS) and Mental Component Summary (MCS) Scores

With the transformed PCS and MCS scores, you would expect approximately 70% of the scores to be between 40 (50 – 10) and 60 (50 + 10). Participants with scores below the mean (50), and particularly below 40 (<-1SD), might find their daily activities affected by their physical health or by their emotional health and well-being. **Figure 4:7** shows the distributions of the SF12 PCS_ and MCS_ scores for IQ.

The PCS_ scores are in excess of the expected 70% between 40-60, which can be seen in more detail in Figure 3:13 (page 32), the histogram plot. **Figure 3:15** (page 33), the histogram plot of the MCS_ scores, shows a similar distribution. However, here, there is less than 70% of scores in the 40-60 range and 23% in < 40, ie less than -1SD. Normally, one would expect approximately 15% of scores in this region. An excess of scores in the high 50s accounts for the slight leptokurtic, negatively skewed distributions for both variables.

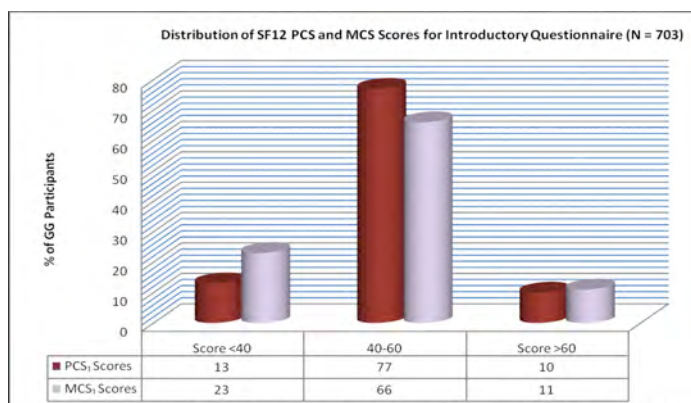


Figure 4:7 Distribution of SF12 PCS and MCS Scores for IQ (N = 703)

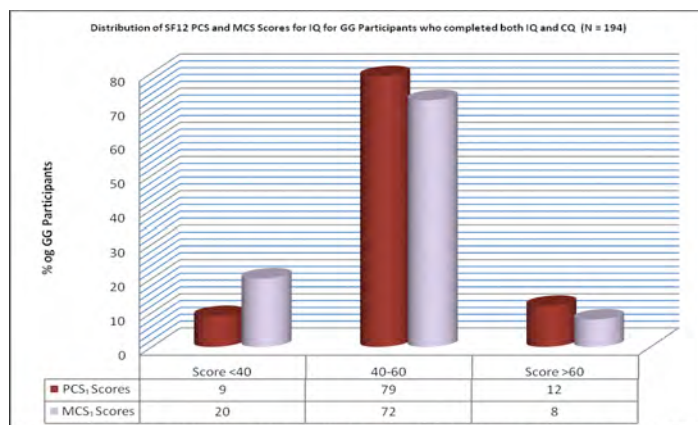


Figure 4:8 Distribution of SF12 PCS and MCS Scores for IQ for GG participants who completed both IQ and CQ (N = 194)

Figure 4:8 shows the same distribution of scores for GG participants who completed both IQ and CQ. Once again, PCS_ scores are greater than 70% in the 40-60 range and MCS_ scores are greater than 15% in the < 40 range.

Consideration of both **Figure 4:7** and **Figure 4:8** suggests that there was a higher proportion of GG participants whose daily activities may be affected by their emotional health than one would expect from a normal population. Further research would need to look at such distributions and, probably, in relation to referrals from health and social care organisations.

4.2.7: GP Visits

Asking GG participants the number of visits made to their GP in the last four weeks was added to the IQ on the second print-run. This was suggested by a health professional at a TCV-Green Gym Workshop in South Wales; it being considered a simple health benefit measure alongside SF12. For CQ, slips were to be distributed with the questionnaire but very few were.

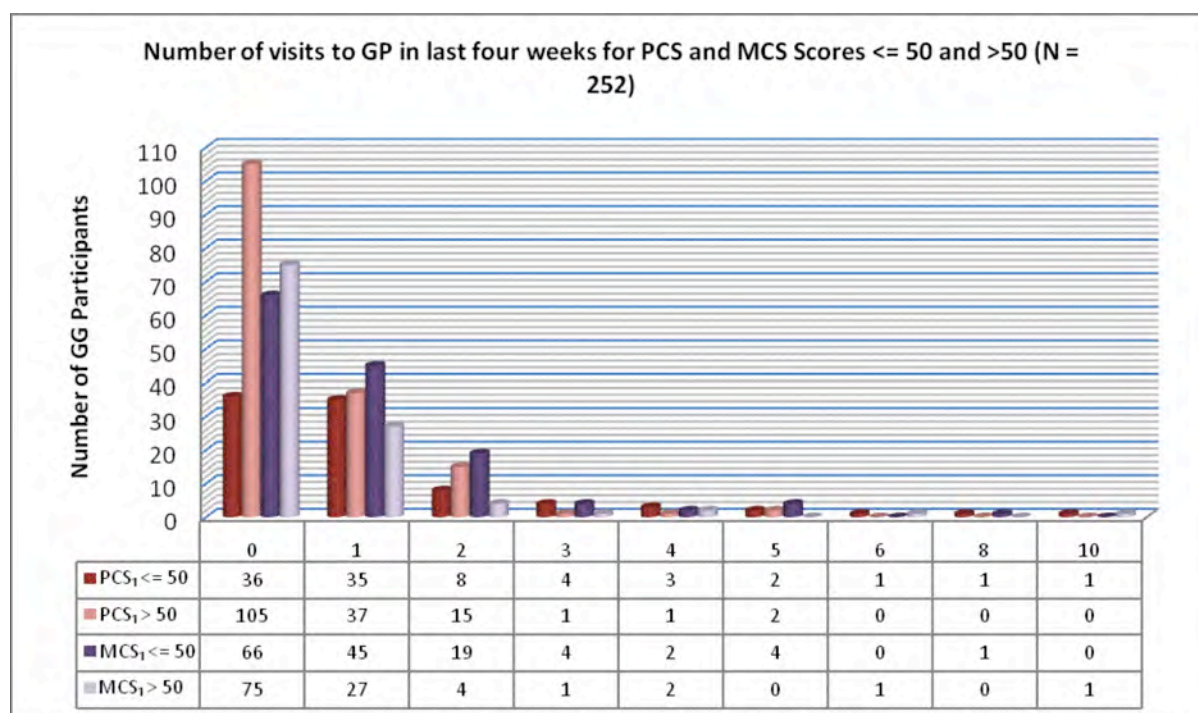


Figure 4:9 Visits by GG participants to their GP in last four weeks for PCS and MCS scores ≤ 50 and >50

Figure 4:9 shows visits to the GP for PCS₁ and MCS₁ scores ≤ 50 and for > 50 . Of those GG participants making a visit to their GP there was no difference in the PCS₁ scores for each score range (49%: 51%, respectively) but for MCS₁ scores, 68% of GG participants had an MCS₁ score ≤ 50 and 32% had an MCS₁ score > 50 . For the one GG participant who visited their GP 10 times, it appears it was for a physical rather than a mental health problem!

Such distributions suggest a greater focus on the characteristics of sub-populations of GG participants would be an important factor in further research, particularly if ‘referrals’ from health and social care professionals continue to be a feature of GG ‘recruitment’. With the Green Gym being featured in Department of Health (DH) White Papers (DH, 2004; 2006; 2008), there is a strong likelihood that GG will be seen even more as a key part of the public health agenda, with a concomitant rise in referrals.

4.2.8: Activity Levels

With a regular commitment to green exercise through GG, any consequent increase in activity levels more generally would be another bonus to joining a GG. The public health agenda is currently addressing obesity and physical activity recommendations from Chief Medical Officer sit alongside this ‘pandemic’. Five half hour sessions of moderate activity

are recommended per week. Walking for two and a half hours per week equates to between five (5) and 11.25 METs, depending on pace and terrain. For 411 GG participants, whose activity levels were calculated in METs, the mean activity per week was 38.9 METs; with one participant claiming over 120 METs, equivalent to 34 hours of moderate walking per week.

Given that GG participants were asked to recall their activities of the previous week, when completing the questionnaire, over-exaggeration may well feature generally for 'active' people. Other green exercise research (eg on Health Walks; Boller, personal communication) has found similar findings. For 'less active' people, the initial record on IQ was felt to be a more accurate measure of activity.

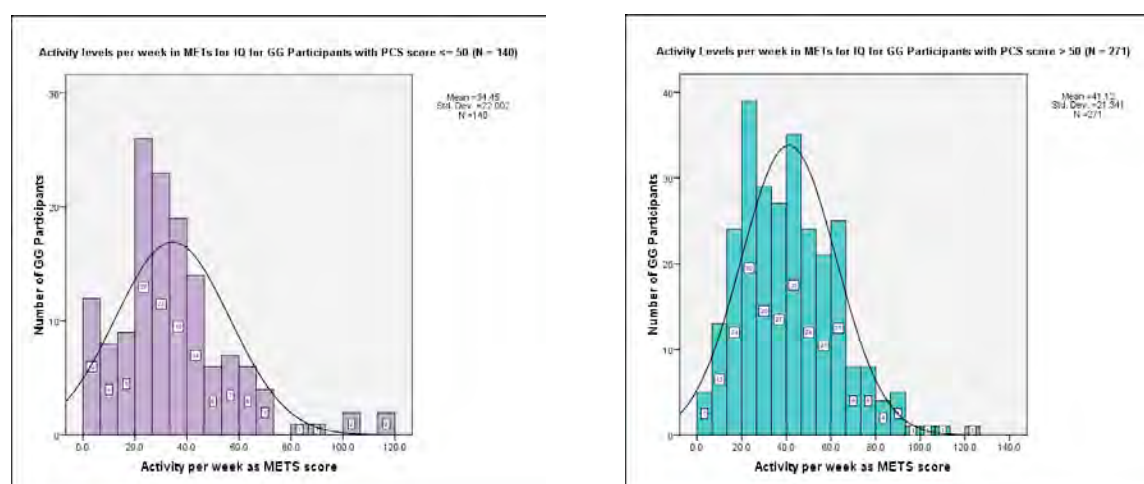


Figure 4:10 Activity levels for IQ for GG participants with PCS scores ≤ 50 and > 50

Figure 4:10 shows the distributions of METs scores for GG participants with scores of PCS ≤ 50 and > 50 . Not un-expectedly, the means vary (34.5 and 41.1, respectively) showing again how SF12 PCS scores differentiate sub-groups in a similar manner to GG participants with scores \leq mean METs score and $>$ mean METs Score and the source of where they heard about GG; see **Figure 4:11** below

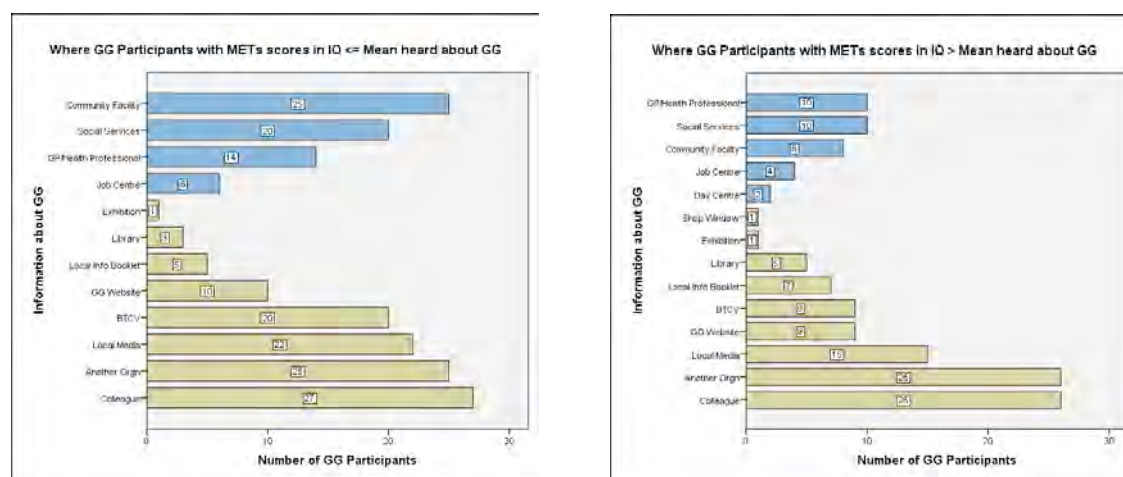


Figure 4:11 Where GG participants heard about GG and activity scores in relation to METs mean

Thirty-seven percent (37%) of GG participants with activity scores \leq METs mean heard about GG from a health and social care source compared to 25% of those with scores $>$ METs mean.

4.3: Findings from comparison of Introductory Questionnaire and Continuation Questionnaire measures

4.3.1: SF12 PCS__ Difference Scores

On average GG participants scored significantly higher on SF12 PCS_ (Mean = 52.42) than on SF12 PCS_ (Mean = 51.55). This *difference between means (paired samples t-test)* was equivalent to a medium effect size ($r = 0.27$) (Cohen, 1988; 1992), where the effect accounts for nine percent (9%) of the total variance. **Figure 3:19** (page 38) shows the error bar graph of adjusted PCS_ and PCS_ Scores (Field, 2006; pp279-285).

This overall significant change on PCS scores hides the relation between which types of GG participants' scores are responsible for the effect. The *Linear regression: PCS___ (Outcome) as predicted by PCS_* provides further information on changes in PCS scores.

There was a significant linear regression (-0.395) between PCS_ as the predictor variable and PCS___ as the outcome variable. For every increase of 1.0 unit in PCS_, there is a decrease of -0.39 units in PCS___. **Figure 3:20** (page 39) shows the regression line for 194 GG participants. Although the regression is modelled on all GG participants, inspection of the distribution of points on **Figure 3:20** strongly suggests that GG participants scoring low on the SF12 PCS scores on IQ are those who are 'improving' the most and are probably responsible for the overall significant difference in means of PCS_ and PCS__.

In the spirit of Tukey's (1977) '*Exploratory data analysis*', the parameters of the transformed SF12 scale scores provided a 'structure' to dissect the regression data. The mean of the transformed scores is 50, with a standard deviation of +/- 10. Thus the number of GG participants scoring below or equal to the mean on IQ and whose PCS___ was positive – they maintained or had an improvement in their PCS score on CQ – was calculated. Similarly, such calculations (see **Table 3:3**; page 41) were done for:

- Scoring below or equal to the mean on IQ with negative PCS___ (score on CQ was lower)
- Scoring above or equal to 50.01 on IQ with positive PCS___ (score on CQ was maintained or was higher)
- Scoring above or equal to 50.01 on IQ with negative PCS___ (score on CQ was lower)

There was a significant association between PCS_ scores and GG participants' PCS_ scores being maintained, increasing or reducing [$\chi^2(1) = 37.89$]. Participants with a PCS_ ≤ 50 are 8.9 times more likely to get an equal or higher PCS_ score.

Those participants who are the worst off physically – their physical health might affect their daily activities – are those that have the room for and are improving the most. The implications of this premiss are:

- In future research on the benefits of green exercise, inclusion criteria should specify participants in a more vulnerable state of health, physically, and their numbers should be increased to satisfy effect size and power calculations in order to test out this observation.
- Any such future study should contain a control group to qualify whether a regression to the mean is not present in less vulnerable state of health participants

- The above conditions would help to rule out confounding variables producing the 'improvement' effect

Another significant linear regression was where SF12 PCS____ was the outcome variable and 'Educational Level' (EL) was the predictor variable (see **Figure 3:23**; p42).

For every increase of 1.0 unit in EL, there was an increase of 1.08 units in PCS____. Ironically, 'increase' in the nominal categories of EL (1 – Degree to 5 – No formal qualification) was in fact a lowering of educational attainment.

Anecdotal evidence on the character of GG projects points to the fact that GG participants with no formal qualifications or with vocational qualifications (4) were often recommended to join GG projects by professional carers, health professionals and Social Services. Such participants might also have mental health issues or learning disabilities.

Given this relationship between EL and recommendation for joining, the notion that the 'worst off', physically, improve their PCS scores over the period of time on a GG project, is supported.

The time-gap between completion of IQ and CQ varied from one (1) to 29 months; with a mean of 8.42 and standard deviation of +/- 5.52. This was determined from 183 of 194 GG participants. Time-gap did not prove to be a significant predictor of PCS____ scores.

Although this implies the benefits (or not) of being a participant member of a GG project does not relate to when measures are taken, the greater the gap, the greater the opportunity for confounding factors to be alternative explanations of PCS score improvement. From this, future studies should standardise the time-gap between measures following qualitative interviews with GG participants on their impressions of 'noticing benefit'. (See **Figure 4:12.**)

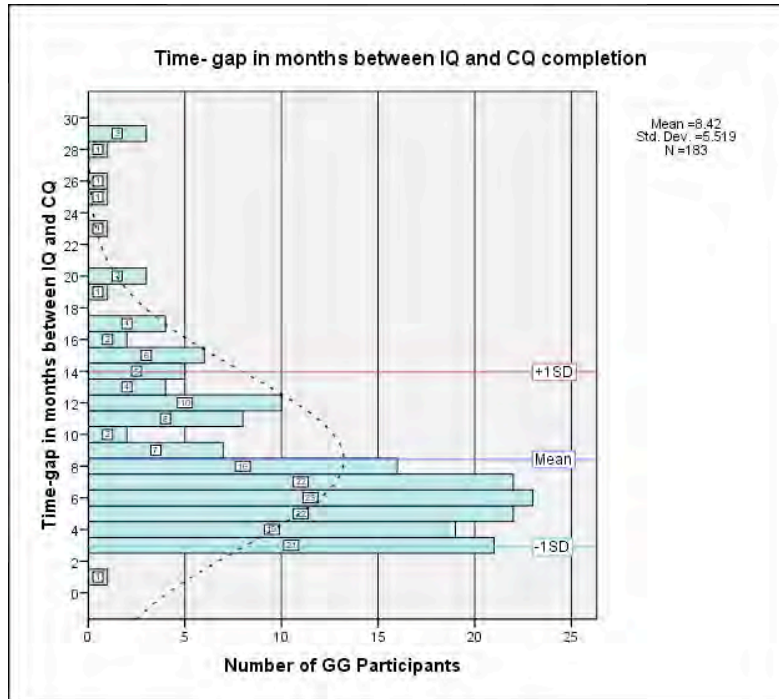


Figure 4:12 Time-gap in months between IQ and CQ completion

4.3.2: SF12 MCS___ Difference Scores

On average GG participants scored lower on SF12 MCS_ (Mean = 48.50) than on SF12 MCS_ (Mean = 50.17). This *difference between means (paired samples t-test)* was significant and was equivalent to a small effect size (Cohen, 1988; 1992), where the effect accounts for one percent (1%) of the total variance. **Figure 3:24** (page 43) shows the error bar graph of adjusted MCS_ and MCS_ Scores (Field, 2006; pp279-285).

This overall significant change on MCS scores hides the relation between which types of GG participants' scores are responsible for the effect. The *Linear regression: MCS___ (Outcome) as predicted by MCS_ , PCS_ and the Time-gap between date of completion of IQ and CQ (months)* provides further information on changes in MCS scores.

Time-gap was not a significant predictor of MCS___.

There was a significant linear regression (-0.473) between MCS_ as the predictor variable and MCS___ as the outcome variable. For every increase of 1.0 unit in MCS_, there is a

decrease of -0.47 units in MCS____. **Figure 3:25** (page 44) shows the regression line for 194 GG participants. Although the regression is modelled on all GG participants, inspection of the distribution of points on **Figure 3:25** strongly suggests that GG participants scoring low on the SF12 MCS scores on IQ are those who are 'improving' the most and it is those GG participants scoring above the mean, in the high 50s, low 60s, on IQ, who are probably responsible for the overall significant difference in means of MCS_ and MCS_. Such GG participants, whose mental well-being is unlikely to affect their daily activities, have lower MCS_ scores, with a negative MCS____, but still maintain MCS scores above the mean, which suggests that their daily activities are unaffected by mental well-being.

Again invoking the spirit of Tukey's (1977) *'Exploratory Data Analysis'*, the parameters of the transformed SF12 scale scores (Mean = 50, SD \pm 10) provided a 'structure' to dissect the regression data. Thus the number of GG participants scoring below or equal to the mean on IQ and whose MCS____ was positive – they maintained or had an improvement in their MCS score on CQ – was calculated. Similarly, such calculations (see **Table 3:4**; page 47) were done for:

- Scoring below or equal to the mean on IQ with negative MCS____ (score on CQ was lower)
- Scoring above or equal to 50.01 on IQ with positive MCS____ (score on CQ was maintained or was higher)
- Scoring above or equal to 50.01 on IQ with negative MCS____ (score on CQ was lower)

There was a significant association between MCS_ scores and GG participants' MCS_ scores being maintained, increasing or reducing [____ (1) = 28.04]. Participants with a MCS_ \leq 50 are 2.5 times more likely to get an equal or higher MCS_ score.

Once again, those participants who are the worst off mentally – their mental health might affect their daily activities – are those that have the room for and are improving the most. This analysis provides support for the previously stated ruminations on future research relating to: supporting the inclusion and increasing the numbers of the more vulnerable, mentally and physically; including a control group; the ruling out of confounding variables, which might be producing spurious, artefactual effects.

However, further questions remain in relation to what predicts MCS____ scores. There was also a significant linear regression with PCS_ as predictor variable and MCS____ as outcome variable. (See **Figure 3:26**; page 45.) For every increase of 1.0 unit in PCS_, there was an increase of +0.21 units in MCS____.

With MCS___ as outcome variable, there is:

- A negative significant linear regression (24% of variance) with MCS_ as predictor variable
- A positive significant linear regression (7% of variance) with PCS_ as predictor variable

The question that is raised by these contrasting directions is how and when do these effects manifest themselves as a 'consequence' of belonging to a GG project. Does physical well-being improve through the benefits of exercise? Does physical well-being precede emotional well-being?

Although time-gap was not a significant predictor of PCS___ or MCS___, **Figure 4:13** shows the number of months between the completion of questionnaires by the number of GG participants completing the questionnaires for time-gaps of three (3) to eight (8) months. This range of time-gap saw the completion of 67% of the Continuation Questionnaires (N = 123 of 183 GG participants, who provided dates to ascertain the gap).

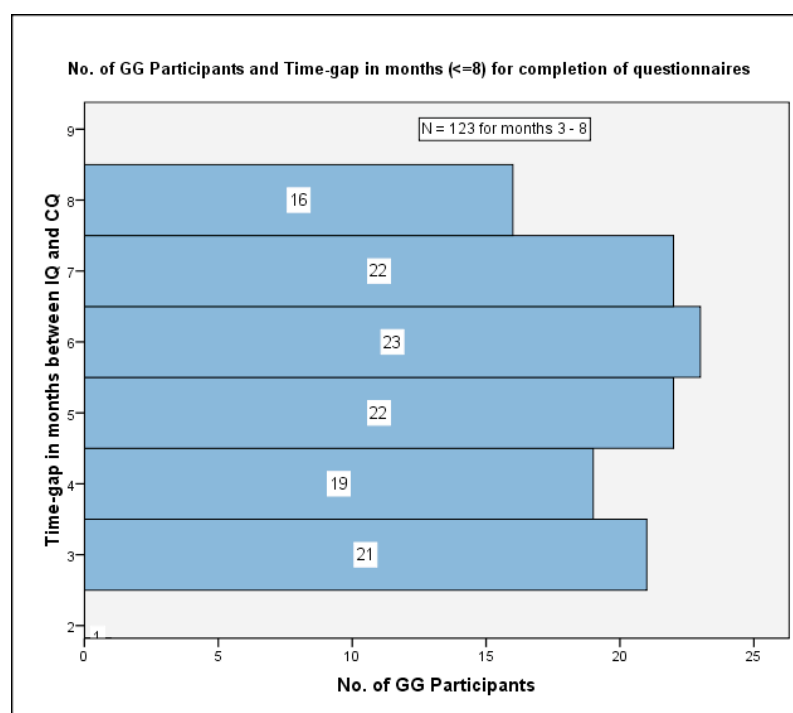


Figure 4:13 Time-gap for completion of questionnaires for three (3) to eight (8) months.

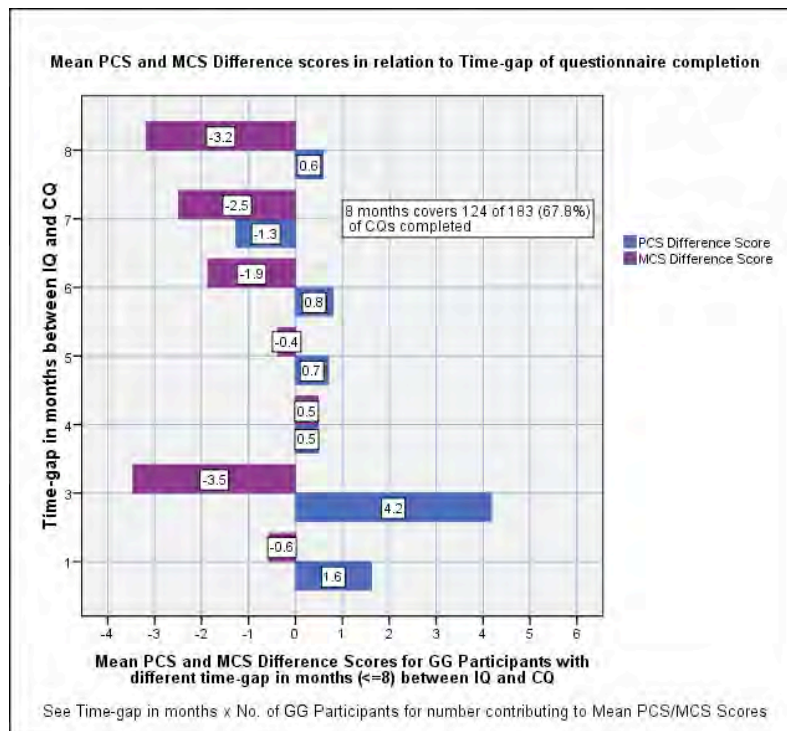


Figure 4:14 Time-gap (3 – 8 months) by mean PCS/MCS Difference Scores

Figure 4:14 shows the means of PCS and MCS Difference Scores (PCS___ and MCS___) for GG participants who completed IQ and CQ with a time-gap of three (3) to eight (8) months. For example, by examining both **Figure 4:13** and **Figure 4:14**, 21 GG participants completed the CQ three (3) months after IQ. And the mean PCS Difference score of 21 participants was + 4.2; their PCS_ scores were on average 4.2 points higher than their PCS_ scores. And the mean MCS Difference Score was – 3.5; their MCS_ scores were on average 3.5 points lower than their MCS_ scores.

As can be seen from **Figure 4:14**, three months would appear to be a ‘good’ time-gap to see the benefits of GG participation on physical well-being, whereas negative mean MCS Difference Scores are found at three (3), six (6), seven (7) and eight (8) months (n = 21, 23, 22, 16 respectively).

These variations in ‘Time-gap Difference Scores’ support an earlier suggestion that future research should ‘control’ the data collection points to provide more evidence on the infrastructure of how and when benefits accrue (or not). Knowing how to structure activities, change locations to maximise positive effects would contribute to the knowledge of the green exercise therapy.

Based on the paired samples t-test, the difference between the means for PCS scores equates to a *medium* effect. Similarly, the difference between the means for MCS scores equates to a *small* effect (Cohen, 1988; 1992).

PCS_ scores are significantly negatively correlated with MCS_ scores (Pearson's Product Moment Correlation Coefficient, $r = -0.139$, $N = 194$, $p = .05$ (2-tailed)).

These additional two statistics support the notion above that the benefits (or not) of GG operate differentially on physical and emotional well-being in terms of order and magnitude of effect.

Such differentiation suggests that there may be 'nonspread' (Ferlie, Fitzgerald, Wood & Hawkins, 2005) between the ethos or culture of TCV and the concept Green Gym and the social and health professional organisations that recommend more vulnerable adults to join a GG project. Multi-professionalism shapes 'nonspread' by erecting social and cognitive boundaries between individual professionals who operate within uni-disciplinary communities of practice, thus retarding spread.

Physical well-being engendered by physical activity operates as a working concept in both the domains of GG project leaders and social and health care professionals. However, the professional and therapeutic support of mental well-being may not be 'spread' with the same depth of understanding.

4.3.3: Activity levels in Metabolic Equivalent Tasks (METs; METs___)

On average GG participants scored higher on METs_ (Mean = 43.37) than on METs_ (Mean = 41.52). This *difference between means (paired samples t-test)* was not significant, although it equated to small effect size (Cohen, 1988; 1992). **Figure 3:29** (page 48) shows error bar graph of adjusted METs_ and METs_ Scores (Field, 2006; pp279-285).

The METs data for 190 GG participants were analysed in a simple linear regression using SPSS (version 16).

There was a significant *linear regression* (*METS___ (Outcome) as predicted by METs_*). For every increase of 1.0 unit in METs_, there is a decrease of -0.48 units in METs___.

Figure 3:30 (page 49) shows regression line for 190 GG participants.

To 'explore' the distribution (Tukey, 1977) of GG participants' scores for this significant regression, further descriptive statistics were calculated which separated GG participants as follows:

- Scores \leq [METs_ Mean] and scores $>$ [METs_ Mean] on the IQ
- Scores \leq [METs___ Mean] and scores $>$ [METs___ Mean].

The mean of the METs_ scores was 41.52. The mean of the METs___ scores was 1.85.

Pictorially, the scatter plot was divided into quadrants about the means of the axes.

Table 3:5 (page 50) summarised these 'quadrants'.

There was a significant association between METs_ scores and GG participants METs___ scores. Participants with a METs_ \leq [METs_ Mean] are 3.4 times more likely to get a METs___ score higher than METs___ Mean OR participants with a METs_ $>$ [METs_ Mean] are 3.4 times more likely to get a METs___ score lower than METs___ Mean.

This pattern of exploratory analysis of the scatter plot of METs___ (outcome, O) as predicted by METs_ (predictor, P) reflects similar explorations of the negative significant regressions of PCS___ (O) by PCS_ (P) and MCS___ (O) by MCS_ (P). Those GG participants who have scores lower than the mean on IQ are 8.9, 2.5 and 3.4 times, respectively, more likely to get positive difference scores on all three measures (PCS, MCS and METs).

The worst off have more room for improvement or the worst off improve the most? Or both? Whatever the answers are to these related questions, there are implications for the training of GG Project Leaders, the organisational infrastructure of GG sessions, including the role development of participants, and the professional relationship with health and social care organisations. Ferlie et al's (2005) notion of 'nonspread' may be a starting point.

What expectations do health and social care professionals have, when recommending more vulnerable adults to join a Green Gym? What role do GG Project Leaders perceive themselves as fulfilling in projects where, for example, social services suggest membership of the depressed and unemployed? The GG projects vary in their nature, as do their self-supporting status. Regional, socio-economic variations contribute to a diversity of

programmes and ways of working. Such diversity should be applauded whilst further research seeks more specific answers to the questions.

These issues will be discussed further in **Section Five: Conclusion and Recommendations**.

5.0: Section Five: Conclusion and Recommendations

*The 'worst off' have more room for improvement
or the 'worst off' improve the most? Or both?*

5.1: Content

Two sets of *Recommendations* emerge from the *Discussion* of the *Results*: a) those relating to **the future of the GG concept** and b) those relating to **future research on the health benefits of green exercise**; such recommendations not being mutually exclusive.

5.2: The future of the GG concept

Recommendations relating to the future of the GG concept have an aetiology in the fact that two distinct populations of GG participants emerge from this National Evaluation.

Broadly speaking, the two populations can be categorised as:

- Those who volunteer to join a GG to improve their own wellbeing through undertaking conservation work; this group essentially self-refer
- Those who are 'referred' to the Green Gym by their GP, other health professional, carer or social services with the recommendation that they attend as a way of improving their wellbeing through voluntarily undertaking conservation work.

A greater proportion of the GG participants who were 'referred' to the project had lower SF12 scores when compared with 'self-referred' participants. **Figure 4:3** (pp54-55) shows this division of participants.

Interestingly, in respect of this referral group, only 18% of GG participants, who heard about GG from their GP or health professional had undertaken conservation work before; similarly only 28% had previously 'volunteered'. **Figure 4:6** (p57) shows similar data for other information sources in the health and social care cluster.

By contrast, the self-referring volunteers were more likely to have answered 'yes to previous conservation' and 'yes to previous volunteering'. Furthermore, a greater proportion of the self-referring participants heard about the GG through sources, such as word of mouth and organisation/media. Importantly, here, the GG Website and TCV are providing a more likely source of information for previous conservationists than for previous volunteers.

Furthermore, consideration of both **Figure 4:7** and **Figure 4:8** (p59) suggests that there was a higher proportion of GG participants whose daily activities may be affected by their emotional health than one would expect from a normal population. Visits to participants' GPs reflected these figures. With GG being featured in DH White Papers (DH, 2004; 2006; 2008), there is a strong likelihood that GG will be seen even more as a key part of the public health agenda, with a concomitant rise in referrals. TCV needs to address how can GG respond to such changes in 'recruitment'.

SF12 PCS_ scores differentiate the two groups (self-referrals and health profession/social care referrals) in a similar manner to GG participants with scores \leq mean METs score and $>$ mean METs score and where they heard about GG; see **Figure 4:11** (p62). Thirty-seven percent (37%) of GG participants with activity scores \leq METs mean heard about GG from a health and social care source compared to 25% of those with scores $>$ METs mean

Another significant positive linear regression, which makes a case for the volunteer/referral distinction, was where SF12 PCS___ was the outcome variable and 'Educational Level' (EL) was the predictor variable (see **Figure 3:23**; p42). Ironically, 'increase' in the nominal categories of EL (1 – Degree to 5 – No formal qualification) was in fact a lowering of educational attainment. Thus, those participants with a lower level of educational attainment were improving the most physically, as measured by SF12 Physical Component Summary Scores in both IQ and CQ.

Anecdotal evidence suggests that GG participants with no formal qualifications (5) or with vocational qualifications (4) were often recommended to join GG projects by professional carers, health professionals and Social Services. Such participants, as well as having lower PCS_ scores, might also have mental health issues or learning disabilities. Thus, the 'worst off', physically, as referrals, improve their PCS scores the most over the period of time on a GG project, adding to the case of distinct groups, made above.

TCV's vision is a better environment where people are valued, included and involved; that everyone has something to offer as a volunteer, regardless of their health status. Consequently, volunteers with health problems and disabilities are involved in all areas of TCV's work, not just the Green Gym. As a national charity, established in 1959, TCV involves a quarter of a million volunteers each year in a range of projects; for example, and of particular relevance here, since 1994, TCV has worked with Jobcentre Plus Disability Employment Advisers in Yorkshire, who refer people onto TCV programmes.

To support such work, TCV has developed a comprehensive range of policies, procedures and training for staff and volunteers working with vulnerable people. However, because the aim is to provide volunteers with a normalised and integrated experience, TCV staff are not trained to become 'health and social care workers'. Here, TCV's strength is engaging people in environmental activity. When working with vulnerable groups, TCV work in partnership with organisations which can provide the necessary health and social care expertise. In addition, TCV operates a policy of 'indirect supervision' whereby vulnerable groups or individuals are accompanied by a carer when attending TCV activities such as the Green Gym.

Such a context and considerations make for a possible review of GG infrastructure in relation to:

- A review of further training of GG Project Leaders to incorporate/differentiate the facilitation of volunteers and referrals from vulnerable groups
- A review of the organisation of GG sessions, to inculcate the concomitant new objectives addressing the personal development of participants (and possibly carers)
- Further development of the professional relationship with health and social care organisations, in order to continue to address the nature of referrals, their needs and the joint expectations of both the health and social care professionals and TCV
- Reviewing the characteristics of GG projects in relation to referrals and the concomitant inclusion/diversity issues

Such a review should inculcate existing TCV policy and procedures of working with vulnerable groups and GG training programmes that include working with people with mental health problems. Although TCV already has a lot of experience in this area, this would be an opportunity to re-visit the issues in conjunction with health and social care organisations.

Here, issues relate to the expectations of health and social care organisations when recommending clients to join Green Gyms and the perceived role of GG Project Leaders in facilitating the well-being of participants through green exercise.

Ferlie, Fitzgerald, Wood & Hawkins (2005) recognised that the social and cognitive infrastructures of different professional groups impeded the organisational benefits from multi-disciplinary working, coining the term 'nonspread' to reflect this lack of knowledge transfer and utilisation. The potential 'nonspread' between the social, organisational and cognitive infrastructures of the health and social care organisations, who refer vulnerable

groups to Green Gym, on the one hand, and the concept of Green Gym and workings of TCV, on the other, is a possible area for review and development.

As noted in **Section 4: Discussion** (p70), physical well-being engendered by physical activity operates as a working concept in both the domains of GG project leaders and social and health care professionals. However, the professional and therapeutic support of mental well-being may not be 'spread' with the same depth of understanding; does facilitating volunteers in exercise around conservation inculcate the professional expectations and requirements of mental health therapy?

These issues are particularly important for those GG projects, which are already self-sustaining and for self-sustainability *per se* (A group is 'self-sustaining' when its activities are run entirely by local volunteers, who are independently constituted from TCV). With sustainability as a declared aim for TCV's GG projects, do self-sustaining projects, restrict the recruitment of referrals from health and social care organisations or do they become part of the infrastructural review and developments at all four levels suggested above? Evidence from TCV suggests that self-sustaining groups do continue to integrate 'referrals'.

Although TCV has a long history of experience in working with vulnerable groups, further evidence may emerge from TCV GG franchises, where the franchisee has, within its organisational structure, trained health/social care professionals relating to particular client groups, who are thought to benefit from GG activities. However, it should be noted that not all TCV GG franchises are health and social care organisations.

The variations in 'Time-gap Difference Scores' (see **Figure 4:14**; p69) suggest more evidence is required on how GG infrastructure impacts on how and when health benefits accrue (or not). Incorporating knowing how to structure activities, when to change locations to maximise positive effects for both referrals and volunteers would contribute further to the knowledge of the green exercise therapy.

Such discussions, within and between TCV and health/social care organisations, and any subsequent changes to GG project organisation and structure, would contribute to recognising, relating and responding to these distinct groups.

5.3: Future research on the health benefits of green exercise

A greater focus on the characteristics of sub-populations of GG participants would be an important factor in further research, particularly if 'referrals' from health and social care

professionals continue to be a feature of GG 'recruitment'. With GG being featured in Department of Health (DH) White Papers (DH, 2004; 2006; 2008), there is a strong likelihood that GG will be seen as having an even greater role in the public health agenda, with the concomitant rise in referrals.

Those participants who are the worst off – their physical and/or mental health might affect their daily activities – are those that have the room for and are improving the most. The implications of this premiss are:

- In future research on the benefits of green exercise, inclusion criteria should specify participants in a more vulnerable state of health, physically and mentally, and their numbers should be increased to satisfy effect size and power calculations in order to test out this observation; such calculations determining the number of GG participants, who need to be recruited to increase the chance of showing significant findings.
- Any such future study should contain a 'control group' to qualify whether a regression to the mean is not present in the 'less vulnerable state of health' participants
- The above conditions would help to rule out confounding variables producing the 'improvement' effect

Variations in SF12 'Difference Scores', in relation to the time-gap between completing IQ and CQ, strongly suggest that future research should 'control' the data collection points to provide more evidence on the infrastructure of how and when benefits accrue (or not). As noted above, knowing how to structure activities, change locations to maximise positive effects would contribute to the knowledge of the green exercise therapy. These recommendations for more 'controlled' data collection and when beneficial effects occur would support TCV's existing initiatives. TCV run 'short sessions' so that people who have poor health or are unfit can manage the length of the activity. Also, in some projects, GGs will start in the afternoon to allow those participants on medication to prepare for sessions.

These recommendations attempt to address questions that were raised in **Section Four: Discussion** (page 72), such as: what expectations do health and social care professionals have, when recommending more vulnerable adults to join a Green Gym?; what role do GG Project Leaders perceive themselves as fulfilling in projects where, for example, social services suggest membership of the depressed and unemployed? Anecdotal experiences have been shared with the author but there was no systematic data collection in this respect for this research project. However, such narratives exist, as do attendance registers, concordance with volunteering, leaders' perspectives, participants' letters and annotations to

questionnaires. The GG projects vary in their nature, and their self-sustainability. Regional, socio-economic variations contribute to a diversity of programmes and ways of working. It is a notable achievement that GG projects already integrate people with mental health problems and learning difficulties with the wider community. Such diversity should be applauded and supported whilst further research seeks more specific answers to the above questions.

Finally, on the basis of this National Evaluation and previous evaluations (Reynolds, 1999; 2002), evidence of the beneficial impact of TCV's Green Gym is increasing and pointing to which groups further focus should be directed. In short, TCV's Green Gym is:

- Recruiting diverse and vulnerable groups to Green Gym projects and integrating them with the wider community
- Demonstrating that through the Green Gym concept, these more vulnerable groups are more likely to improve their scores on measures of physical and mental well-being and physical activity
- Continuing to provide a well-established format for demonstrating the benefits of green exercise in line with public health policies (DH, 2004, 2006, 2008)

6.0: Section Six - References

Cohen J (1988) *Statistical Power Analysis for the Behavioural Sciences* (2nd Edition) New York: Academic Press

Cohen J (1992) A Power Primer. *Psychological Bulletin*, 112, 1, 155-159

Department of Health (2004) *Choosing Health: Making Healthier Choices easier* http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4094550 (Downloaded 28.04.08)

Department of Health (2006) *Our health, our care, our say: a new direction for community services.* http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4127453 (Downloaded 28.04.08)

Department of Health (2008) *Healthy Weight, Healthy Lives: A Cross Government Strategy for England* http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_082378 (Downloaded 28.04.08)

Ferlie E, Fitzgerald L, Wood M & Hawkins C (2005) The nonspread of innovations: the mediating role of professionals. *Academy of Management Journal*, 1, 117-134.

Field A (2006) *Discovering Statistics Using SPSS* (2nd Edition). London: Sage Publications

Howley ET & Franks BD (1986) *Health/Fitness Instructor's Handbook*. Champaign, Illinois: Human Kinetics Publishers, Inc.

Reynolds V (1999) *The Green Gym – Evaluation of a Pilot Project in Sonning Common*. Report No. 8, OCHRAD

Reynolds V (2002) Well-being comes naturally: an evaluation of the TCV Green Gym at Portslade, East Sussex. Report No. 17, OCHRAD

Tukey JW (1977) *Exploratory Data Analysis*. Reading, Mass.: Addison-Wesley

Ware JE, Kosinski M & Keller SD (1994) *SF36® Physical & Mental Component Summary Measures – A User's Manual*. Boston, MA: The Health Assessment Lab, New England Medical Centre.

Ware JE, Kosinski M, Turner-Bowker DM & Gandek B (2002) *How to Score Version 2 of the SF12® Health Survey* Lincoln, Rhode Island: QualityMetric Incorporated

Internet References

TCV Green Gym Website: Downloaded from internet 22.04.2008
<http://www.tcv.org.uk/greengym>

Metabolic Equivalent Tasks: Downloaded from internet 14.02.2008

http://www.abpi.org.uk/publications/publication_details/targetObesity/energy2.asp

SPSS (2008): Downloaded from internet 22.04.2008

<http://www.spss.com/spss/>