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Title:

Understanding the impact of volunteering on pro-environmental behavioural change

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Abstract

This study examines the whether there is an association between engaging in environmental volunteering activities and pro-environmental behavioural change. Utilising self-reported surveys, the study explores the potential impact that environmental volunteering has on people's pro-environmental behaviour over time, using The Conservation Volunteers' two volunteering programmes, Green Gyms and Action Teams, as a comparative case study. Our findings show a positive association between environmental volunteering activities with a person's self-reported pro-environmental behaviours over time. Further, volunteers presented improved impact across almost all of the eight pro-environmental behaviours measured, with differences observed between the two volunteering programmes as well as socio-demographic groupings.

Keywords

environmental volunteering, pro-environmental behaviour, impact measurement, online survey.

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Introduction

Within the last decade, the relationship between engaging in environmental activities (e.g. habitat management, ecological restoration and monitoring wildlife) and pro-environmental behaviours (e.g. recycling, reduced energy consumption and homegrown food) has received increasing attention with regards to its importance for the vitality of communities and the environment (Monroe, 2003; Hargreaves et al, 2011). More recently, the UK government and voluntary sector representatives have highlighted the potential role of volunteering organisations in encouraging people to adopt environmentally friendly behaviours (Hale, 2010; Cabinet Office, 2011). To date, studies are beginning to explore the potential impact that engaging in environmental volunteering may have on people's pro-environmental behaviours and suggest the need to examine these impacts over time as well as any mediating mechanisms and the relationships that may exist between them (Steward et al, 2009; Büchs et al, 2012; Cooper et al, 2015).

This article reports a study which implemented a longitudinal research design, using self-reported surveys, based on two volunteering programmes from a UK environmental charity, The Conservation Volunteers (TCV). TCV is an apolitical charity which avoids activism, and engages in a wide range of environmental activities including habitat management, monitoring wildlife, and ecological restoration.

Specifically, the study aimed to:

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- explore whether environmental volunteering has an impact on peoples' self-reported pro-environmental behaviours;
- assess the types of impact environmental volunteering has on peoples' self-reported pro-environmental behaviours; and,
- examine volunteers' self-reported pro-environmental behavioural change over time, the mediating mechanisms which may cause these, and the relationships that may exist between them.

Environmental volunteering and pro-environmental behaviour

Research has long identified the role of moral concerns, intrinsic motivations and external factors underlying pro-environmental behaviours. Such underlying influences include individual value-based environmental concerns (Dunlap and van Liere, 1978; Stern et al, 1993; de Groot and Steg, 2008), the influence of social norms and culturally accepted behaviours (Cialdini et al, 1991), goal framing and performance (Lindenberg and Steg, 2007), as well as contextual factors and other interventions (Kaiser et al, 1999; Bamberg and Schmidt, 2003; Thøgersen, 2005; Ballantyne and Packer, 2011). Further, some argue that if pro-environmental behaviours are associated with an increase in environmental awareness, then it could be hypothesised that engagement in environmental activities - such as environmental volunteering - might increase these behaviours (Jensen, 2002; Kollmuss and Agyeman, 2002).

Environmental volunteering can be described as the practice of unpaid volunteers, who spend time engaging in a wide range of conservation and outdoor based activities, including habitat management and ecological restoration (Bruyere and Rappe, 2007). A range of benefits for people over the course of their lives has been shown, from civic engagement and enhancing social cohesion to environmental awareness and individual wellbeing (Putnam, 1995; Molsher

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and Townsend, 2015). On these, research has begun to emerge over the association of pro-environmental behaviours with the ability to promote behaviour which aims to improve environmental quality (Stern, 2000; Steg et al, 2014). Such an assumption is strengthened by findings which suggest a positive link between people's pro-environmental behaviour and engagement in environmental activities, including connectedness (Nisbet et al, 2009), environmental literacy (Dresner et al, 2014) as well as wildlife recreation advocacy (Cooper et al, 2015). In this way, participating in environmental volunteering and nature-based activities can be seen as equally important, increasing a person's engagement in pro-environmental behaviours and commitment through direct experience (Chalwa, 1999; Hartig et al, 2007). To date, studies are beginning to explore the potential impact that engaging in environmental volunteering may have on people's pro-environmental behaviours and suggest the need to examine these impacts over time as well as any mediating mechanisms and the relationships that may exist between them (Steward et al, 2009; Büchs et al, 2012; Cooper et al, 2015).

It is therefore anticipated that our current understanding of the benefits of volunteering on creating pro-environmental behaviours would be better understood if we identify the long-term trends as well as the relationships and pathways between environmental volunteering and pro-environmental behaviours. This in turn would allow volunteering services to better develop programmes to encourage pro-environmental behaviours. In addition, we believe it will allow metrics of success for volunteering services to be enhanced. Therefore, this article aims to explore this gap in knowledge as well as variables affecting environmental volunteers' pro-environmental behaviours.

Variables affecting volunteers' pro-environmental behaviour

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Researchers have highlighted methodological challenges associated with measuring pro-environmental outcomes owing to the inability to ascertain the reason for a change in behaviour. This can make it difficult to know the extent to which change derives from an individual cause or intervention (Steward et al, 2009). As such, more in-depth and longitudinal research is needed to distinguish long and short term affects as well as other external influences (Büch et al, 2012). In response, the study reported here pays particular attention to three key variables.

First, the time duration and level of engagement in environmental volunteering activities. As studies show, an individual's measure of environmental concern and behaviour can be associated with their measure of connectedness to the environment, such as through engaging in nature-based activities and wildlife recreation (Mayer and Frantz, 2009; Nisbet et al, 2011). As such, this has led some researchers to view environmental activities as a cost-effective approach to enhance pro-environmental behaviours (Collado et al, 2015). In this way, this article attempts to build upon previous studies that find environmental experiences to be fundamental in influencing nature-related values, affiliations and pro-environmental behaviours in association with environmental volunteering activities (Büchs et al, 2012; Dresner et al, 2014; Collado et al, 2015; Molsher and Townsend, 2015).

Second, the type of environmental volunteering programme that a person engages in with relevance to context, activities, and experiences. To date, emerging studies explore the differences between types of wildlife recreational activities (e.g. hunting and birdwatching) and show how these factors may impact on volunteers' pro-environmental behaviours (See Cooper et al, 2015). Much of our understanding is therefore drawn from this literature as well as other related fields. For example, in organisational research workplace factors (e.g. culture, support and environmental infrastructure) can influence or shape people's attitudes and behaviours when

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faced with new interventions (Young et al, 2015). Similarly, some studies on environmental sustainable behaviours in eco-tourism remark that intervention activities (e.g. workshops and educational materials) increase people's awareness and education in related issues, each generating various outcomes (Ballantyne and Packer, 2011). With this in mind, the study reported here compares two volunteering programmes which differ in regards to their focus and associated activities in an effort to understand if and how these factors may have an impact on volunteers' pro-environmental behaviours.

Third, external factors and mediating mechanisms which can affect pro-environmental outcomes. These can include socio-demographic status (Chen et al, 2011), skills development and learning (Donald, 1997; England and Marcinkowski, 2007) as well as social interactions and perceived social norms (Göckeritz et al, 2010; Dresner et al, 2014; Kalkbrenner and Roosen, 2015). However, due to the size and scale of collecting such data, the article explores and focuses on one of these aspects: socio-demographic status (gender, age, income and ethnicity). To date, more generalised studies considering socio-demographic status effects associated with pro-environmental behaviours show mixed findings across gender (Stern et al, 1993; Zelezny and Bailey, 2006; Lee, 2009), age (Scott and Willits, 1994; Tindall et al, 2003), income (van Liere and Dunlap, 1980; Chen et al, 2011) and ethnicity (Dresner et al, 2014). This study therefore aims to progress existing research (Nisbet et al, 2009; Dresner et al, 2014; Cooper et al, 2015), providing further evidence on the long-term trends and outcomes associated with different environmental volunteering programmes across the demographic spectrum.

Methodology

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To explore whether there is a relationship between environmental volunteering and pro-environmental behaviours, providing a more accurate and in-depth measure over time (Bryman, 2012), a longitudinal research design using self-reported surveys was implemented.

Participating Programmes

Recruitment for the respondents in this study is from two volunteering programmes led by The Conservation Volunteers (TCV), an environmental charity based in Greater London, United Kingdom (UK). The first programme – Green Gyms® – is a volunteering programme that focuses on improving the health and wellbeing of volunteers through engaging in practical work sessions within green spaces to promote biodiversity and organic food growing (e.g. planting trees, sowing meadows and establishing wildlife ponds). It includes warm up and cool down sessions in preparation for a range of light to vigorous activities to suit all abilities. The programme was established in 1997 in collaboration with Dr William Bird, a general practitioner and Strategic Health Advisor to Natural England, who promotes exercise in natural environments. It has been endorsed by the Department of Health to have proven impacts on the volunteers' health and wellbeing as well as on their community spaces. Volunteers that attend these programmes do so on their own initiative as well as those attending following advice by their GP.

The second programme – Action Teams – is a volunteering programme aimed at managing and conserving a wide range of natural habitats throughout Greater London. The programme holds weekly sessions throughout the year and engages volunteers in a variety of conservation projects. Projects include habitat management, creation, restoration and maintenance as well as creating new nature gardens for local communities and schools. The programme was established in 1959

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when the charity was initially set up to engage volunteers in practical conservation work.

Volunteers that attend these programmes do so on their own initiative.

This study has no specifications in relation to sampling populations, including as many voluntarily consenting participants as possible without undue coercion. This study's recruitment methods aim to gain a representational cross-section of those volunteers in each of the two volunteering programmes. This includes contacting volunteers by email and assistance from TCV staff within the volunteering setting.

The sample comprises of 952 volunteers each of whom completed a baseline survey, 161 completed a first follow up survey, and 63 completed a second follow up survey – a response rate of 13.8% and 5.4% respectively. This attrition rate between surveys is consistent with participatory patterns of TCV volunteers identified by Seymour and Haklay (2016), where only a small proportion of volunteers continue to engage in long-term volunteering activities. Similar quantitative patterns are noted in other related volunteering studies (Reed and Selbee, 2001; Mohan and Bulloch, 2012; Hyde et al, 2016). This small number of volunteers completing all three waves of the questionnaire survey affected our ability to undertake any in-depth statistical analysis (e.g. between socio-demographic categories), and may also have created possible non-response bias. As table 1 shows, volunteers in both programmes are from a diverse demographic backgrounds, and those continuing to engage in the first and second follow up surveys are mostly representative of the overall baseline sample's demographic characteristics.

Table 1: Descriptive statistics of volunteers' demographic characteristics (n = 952) in percentage.

[Table 1 goes here].

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Research Design and Data Collection

This study uses a longitudinal design to assess the impacts of environmental volunteering on respondent's behaviours over time. It assesses the self-reported responses of volunteers to the Change! Tool self-completion questionnaire survey (See appendix 1), which was initially developed by the World Wildlife Fund (WWF) and CAG Consulting (See www.community-engagement.co.uk). The survey is based on the Transtheoretical Model developed by Prochaska and DiClements (1986), which incorporates the stages, processes and decisions central to the behavioural change cycle (Norcross et al, 2011). The Change! Tool uses a set of questions to measure a person's self-reported pro-environmental behaviours, using a 5 point Likert scale with a total score of 40. Indicators used in this study focused on the following eight sustainable lifestyle choices: travel, waste management, food growing, community involvement, local decision making, energy use, awareness of local wildlife (termed here as 'Your Area') and shopping behaviour.

Data collection was conducted from 2011 to 2014, using both paper surveys and the online data collection tool Survey Monkey®. Surveys were administered by the project officers through e-mail to those who voluntarily consented, at variable intervals of approximately one, three and six months after starting volunteering sessions. This was due to the nature and practicalities of volunteering activities, where there can be difficulty for surveys to be completed before such sessions begin, particularly if the population sample are unknown before engaging in these activities. It is therefore assumed that a person's baseline is established early on at the start of volunteering.

Data Analysis

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Data was evaluated and summarised using a descriptive approach, due to the nature and scale of the survey data. Total scores and differences between each Change! Tool questionnaire survey completed were first calculated for each volunteer. Differences in baseline scores between respondents and those non-respondents to the later rounds of the survey were calculated to assess the overall representativeness of longitudinal dataset. General descriptions of total in-person scores were then calculated, measuring their central tendency (mean and median) and spread (upper and lower quartiles, standard deviations and range). This was done for those volunteers that completed the baseline and later follow-up surveys only, excluding non-respondents. Total scores were then further subdivided by individual question, demographic category (gender, level of deprivation, age groups and ethnicity) and volunteer programme (Green Gyms and Action Teams). These were explored using a descriptive summary, due to the nature and scale of the dataset, providing a general exploration of the dataset (Costello, 2009). Level of deprivation is a measure of deprivation of the area in which a volunteer lives. Here, we use the Index of Multiple Deprivation (IMD) 2010 dataset for England, calculated at a small area level (i.e. Lower Super Output Area, containing an average population of 1,722) based on selected measurement domains: income, employment, health and disabilities, education, crime, housing and services as well as living environment. In this way, the degree and types of impacts in relation to environmental volunteering activities on people's pro-environmental behaviours could be explored across different demographic groupings as well as different volunteer programmes to assess for variable differences (Dytham, 2011).

Finally, comparisons in volunteer's overall pro-environmental behaviour change scores between first and third surveys was identified using a Paired-Sample *t*-test, which tests whether the mean difference between these scores is different from 0 (Dytham, 2011). Though the sample size to

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conduct this analysis was small (n=63), the test was regarded as feasible, having a large effect size (calculated as the size of the difference between the two-variable means), thereby minimizing the effects of Type I or II errors (See Cohen, 1988 and De Winter, 2013).

All the above analysis was performed using TCV's online database as well as statistical programme R Version 3.1.1 (R Core Team).

Results

General descriptive summaries of volunteers' responses to the Change! Tool questionnaire surveys can be found in table 2. Overall, the average in-person self-reported pro-environmental behaviour scores, which excludes non-respondents, present a slight positive increase from those identified in first and proceeding surveys as indicated in means and medians. Variation between average scores is relatively small, as shown by standard deviations (SD) and quartiles, with most volunteers displaying moderate levels of pro-environmental behaviours. Further, the range between lowest to highest scores is wider in the first and second surveys, with those in the third survey being narrower. Not only is this reflective of sample sizes for each survey, but also suggests that those who engage longer in TCV's environmental volunteering activities rate themselves more similarly. Moreover, a change in sample means is also observed between those volunteers that completed both the first and third surveys only (Paired t ($_{61}$) = -3.24, p=< .002), with an increased mean score of 2.83. As no differences in baseline scores between respondent and those non-respondents to the later rounds of the survey are observed, this suggests longitudinal data can be thought of as representative of the overall sample.

Table 2: General descriptive summaries of TCV volunteers' total scores for each of the Change! Tool questionnaire surveys.

[Table 2 goes here].

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In general, volunteers present improved impact across most of the pro-environmental behaviours (except waste management), with those showing the greatest areas of change being travel and taking part in local decision making activities. Waste management includes the amount of weekly waste that has been recycled as well as water and energy usage in the home. Travel includes the mode of transport used on a regular basis as well as holiday travel. Taking part in local decision making activities includes council meetings, and being involved in local residents' or neighbourhood meetings.

[Figure 1 goes here].

Figure 1: Percentage change in volunteers' mean scores for pro-environmental behaviours measured from first to third surveys.

General descriptive summaries of volunteers' total scores across socio-demographic categories can be found in table 3. First, volunteers living in those areas classified as most deprived are most likely to engage in new behaviours with a direct economic impact (e.g. transport and energy use) than those from least deprived areas which show the lowest level of change. Similarly, differences are observed between gender groups, where on average females show a higher level of pro-environmental behavioural change than males. For example, male volunteers exhibit positive change in relation to travel, tending to report a reduced level of impact in greener shopping behaviours, whereas female volunteers present positive change associated with taking part and organising local activities in their communities, with reduced levels of impacts reported in waste management. Further, positive change is more evident in the 25–54 age range than either the younger or older age groups, and is the case across all of the behaviour change categories. Finally, in terms of ethnicity, volunteers who described themselves as from a non-

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white ethnic background are more likely to get involved in organising community activity than their fellow white volunteers, but appear less inclined to address issues to do with an environmentally friendly lifestyle.

Table 3: Change in total scores of volunteers' pro-environmental behaviours from first to third surveys, subdivided by socio-demographic grouping.

[Table 3 goes here].

Differences were also observed between the two programmes – Green Gyms and Action Teams – with the former presenting greater impact than the latter whose baseline surveys show a much higher level of awareness for environmental issues. For instance, those volunteers who engage in the Green Gyms programme present greater impact across six of the eight pro-environmental behavioural changes (with little or no significant changes for shopping behaviour and waste management). By contrast, those volunteers who attend the Action Teams programme show a reduced level of impact across most of the pro-environmental behaviours, except food growing and travel which present small but appreciable positive impacts.

[Figure 2 goes here].

Figure 2: Change scores total in volunteers' pro-environmental behaviours between volunteering programmes.

Discussion and implications

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Overall, this study finds that volunteers who engage in environmental activities present a slight positive increase in pro-environmental behaviours over time, with variable differences between the two TCV environmental volunteering programmes: Green Gyms and Action Teams. This may relate to the differences in focuses of the two programmes and the motivations of those that attend. For instance, a large proportion of those who join a Green Gym are referred by health practitioners or join because of a motivation to improve their own health rather than environmental concerns. In contrast, Action Teams primarily attract volunteers who are motivated by the idea of undertaking work to improve the environment and so may start from a much higher level of appreciation of environmental issues. These findings progress existing research (Nisbet et al, 2009; Dresner et al, 2014; Cooper et al, 2015), providing further evidence on the long-term trends and outcomes associated with different environmental volunteering programmes across the demographic spectrum. Further, it suggests that voluntary organisations and policy makers may need to reach out to those who would not conventionally engage with environmental activity in order to have the greatest 'return' on their efforts in terms of increased pro-environmental behaviour (Chalwa, 1999; Hartig et al, 2007; Hale, 2010; Cabinet Office, 2011).

To date, few studies examine the environmental performance outcomes of interventions, instead many focus on the methods and tools used to measure behavioural change patterns (Young et al, 2015). This study therefore provides further insight in this area of research and aimed to measure specific self-reported behavioural change outcomes of those involved in environmental volunteering activities. In general, volunteers present positive change across almost all of the eight pro-environmental behavioural indicators used. These findings resonate with similar studies (Donald, 1997; England and Marcinkowski, 2007; Cooper et al, 2015). Further, these

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results also suggest that those who engage longer in TCV's environmental volunteering activities tend to rate themselves more similarly. One reason, as Dresner et al (2014) explains, might be that social interaction amongst those more regular volunteers has the ability to both influence and support individual's attitudes and behaviour (e.g. advice on food growing activities) via perceived social norms (Göckeritz et al, 2010; Dresner et al, 2014).

By contrast, findings identify a negative trend in waste management behaviour amongst almost all volunteers, which to our knowledge has not been found in other similar studies. As such, we attribute this trend to a few factors, including personal finance, time availability, and current infrastructure supporting pro-environmental behaviours (Kaiser et al, 1999; Bamberg and Schmidt, 2003; Thøgersen, 2005). Alternatively, this may also relate to an individual's perceived view of their pro-environmental behaviours. For instance, a person's view of their individual change behaviours in relation to attaining a goal can vary according to the scale (e.g. size of the goal), framing (e.g. at an individual level or compared to the rest of the human population) and attainability of the goal itself (Ajzen, 1991; Lindenberg and Steg, 2007; Venhoeven et al, 2013).

Finally, differences in pro-environmental behaviours are also present when making comparisons between volunteers in terms of their socio-demographic status (e.g. age, gender, ethnicity and level of deprivation) which are largely reflective of those already identified in existing research. First, results show a gender variation in pro-environmental behaviours with females tending to display a higher level of behavioural change, a phenomenon widely supported in existing literature (McStay and Dunlap, 1983; Mohai, 1992; Lee, 2009; McCright and Xiao, 2014). Theoretical explanations for this include the socialisation or process of learnt gender-specific behaviour (Zelezny and Bailey, 2006) as well as value orientation whereby females present stronger values towards those biospheric or environmental components (Stern et al, 1993).

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Second, a positive change is more evident between the ages of 25 and 54 years. Chen et al (2011) suggest that this age group has been more exposed to increasing awareness of environmental issues, with other studies reporting mixed findings (Scott and Willits, 1994; Tindall et al, 2003). Third, though our results suggest that certain types of behavioural change adopted are associated with income (e.g. travel), current research shows more of a mixed picture. Other factors include personal freedom and ability to meet their material needs (van Liere and Dunlap, 1980) as well as being associated to a person's degree of direct exposure to the consequences of environmental degradation (Chen et al, 2011). Lastly, volunteers from ethnic minorities present a higher level behavioural change in areas of civic engagement (e.g. local decision making and community involvement) than those relating to an environmentally friendly lifestyle. A similar finding is also observed by Kalkbrenner and Roosen (2015), whereby social norms and trust are found to be strongly associated with a person's participation in local renewable energy projects, followed by environmental concern. One reason may relate to increased empowerment relating to the volunteering experience itself and working collectively with others for the common good of a local community, with a snowballing effect (Dresner et al, 2014).

Study limitations and future research

This study has four main limitations. First, the findings are specific to volunteers in the Greater London region who engage in environmental activities with TCV. Further work on a much larger scale is needed to explore the relationship between environmental volunteering activities and self-reported pro-environmental behaviours (including external drivers) in other rural and urban UK regions as well as making comparisons with other UK environmental volunteering organisations. As such, it would therefore enable one to determine whether these findings are more widespread. In addition, it would also provide further understanding about the type and scale of external factors that might contribute to these findings, including underlying

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motivations, contextual factors, socio-demographic status, response biases as well as other associated factors (Aarts and Dijksterhuis, 2000; Thøgersen, 2005; de Groot and Steg, 2008).

Second, due to the nature and practicalities of volunteering activities, surveys were administered after volunteers initially engaged in volunteering sessions. It is assumed that a person's baseline is established early on at the start of volunteering and is primarily based on self-reported measures, which therefore reduces our ability to make causal conclusions. With this in mind, future research assessing causal relationships between pro-environmental behaviours and environmental volunteering activities could provide a more comprehensive understanding of its multidimensional complexity as well as associated benefits and drawbacks emerging from these relationships (Steward et al, 2009; Büchs et al, 2012).

Third, the small number of volunteers completing all three waves of the questionnaire survey affected our ability to undertake any further in-depth statistical analysis (e.g. between socio-demographic categories). It may also have created possible non-response bias. Future research is therefore needed on a much larger scale to assess whether there is an association between engaging in environmental volunteering activities and increasingly adopting pro-environmental behaviours over time.

Fourthly, though this study provides a general descriptive understanding of volunteer's self-reported pro-environmental behaviours, further explanation of the changes experienced might be found through the use of qualitative methodological approaches (e.g. interviews and observations). This suggests a need to use mixed quantitative and qualitative approaches in future research. In addition, such mixed method approach allows for a multiple level of perspectives, identifying not only the magnitude and frequency of when something occurs, but

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equally to examine the meaning and understanding of the construct behind its occurrence (Bryman, 2012).

Conclusion

This study explores the potential impact that environmental volunteering has on people's pro-environmental behaviour over time using UK environmental charity, The Conservation Volunteers', as a case study.

Our findings show that volunteers who engage in environmental activities present a slight positive increase in pro-environmental behaviours over time. In general, volunteers present improved impacts across most of the pro-environmental behaviours, with those that engage longer in TCV's environmental volunteering activities rating themselves more similarly. By contrast, almost all volunteers present a decline in waste management behaviour which may relate to various reasons, such as personal finance, time availability, current infrastructure supporting pro-environmental behaviours and perceived social norms. Further, variable differences are observed between the two TCV environmental volunteering programmes compared in this study, Green Gyms and Action Teams, the former presenting a higher measure of impact. Since Green Gyms engages with those who would not conventionally engage with environmental activity, this suggests that voluntary organisations and policy makers may need to reach out here to those to have the greatest 'return'.

We identify differences in pro-environmental change behaviours when making comparisons between volunteers according to their socio-demographic status (e.g. age, gender, ethnicity and level of deprivation) and volunteering programmes. Results show a gender variation, with females tending to display a higher level of pro-environmental behavioural change. A positive change is more evident between the ages of 25 and 54 years. Volunteers who describe

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themselves as from an ethnic minority background are more likely to get involved in organising community activity. Volunteers living in those areas classified as most deprived are most likely to engage in new pro-environmental behaviours that have a direct economic impact (e.g. transport and energy use) than those from least deprived areas which exhibit the lowest level of change. However, their interrelationships and other associated factors remain unclear.

The study also identifies areas warranting more research. For instance, this study serves as a case study focusing on the Greater London region. Future research should make further large scale comparisons across other UK regions and environmental volunteering activities. Similarly, the study is unable to make in-depth causal conclusions due to the nature and practicalities of volunteering activities. It is therefore recommended that any future research uses a mixed method approach to identify potential causal relationships between pro-environmental behaviours and environmental volunteering activities as well as examining the meaning and understanding of pro-environmental behaviours.

Declarations of Interests

All authors declare there to be no competing interests.

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Appendix 1 – Change! Tool questionnaire survey

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SECTION 1: GETTING STARTED

Q1: What is the name of the group you are part of? Please tick one box only.

□ Richmond Project

□ Waltham Forest BAT

□ Haringey Project

□ Croydon Project

□ Greenwich

□ Lambeth BAT

□ Dulwich Woods

□ Kings Cross BAT

□ Lavender Pond

□ Camden Green Gym

□ Penge Green Gym

□ Waltham Forest Green Gym

□ Stave Hill

Other _____

SECTION 2: GETTING ABOUT

We would like to ask you some questions about how you get about and how you use transport.

Q2a: Do you make journeys by car?

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□ Yes Go to question 2b

□ No Go to question 2d

Q2b: Which of the following statements most closely relates to your car use? Tick one box only.

□ I sometimes feel I should reduce the number of journeys I make by car.

□ I often feel I should reduce the number of journeys I make by car.

□ I am starting to reduce the number of journeys I make by car.

□ I have tried to reduce the number of journeys I make by car, but have found it hard to stick to.

□ I have reduced the number of journeys I make by car and think I could reduce them more.

□ I have reduced the number of journeys I make by car and cannot reduce them further

□ I don't think it is necessary to reduce the number of journey I make by car because I don't see car use as an issue.

Q2c: Please tell us more about why the statement you have chosen relates to you?

Q2d: Have you taken holidays using air travel in Europe the last 5 years?

□ Yes Go to question 2e

□ No Go to question 3a

Q2e: Which of the following statements most closely relates to you? Tick one box only.

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□ I sometimes feel I should reduce the number of European flights I take

□ I often feel I should reduce the number of European flights I take

□ I am starting to reduce the number of European flights I take

□ I have tried to reduce the number of European flights I take but found it hard to stick to

□ I have reduced the number of European flights I take and think I could reduce them more.

□ I have reduced the number of European flights I take cannot reduce them further.

□ I don't think it is necessary to reduce of European flights I take because I don't see air travel as an issue.

Q2f: Please tell us more about why the statement you have chosen relates to you.

SECTION 3: IN THE HOME

The following group of questions help us to understand what you do in your home.

Q3a: Which of the following statements most closely relate to your energy use? Tick one box only.

□ I sometimes feel I should reduce the amount of energy I use in my home.

□ I frequently feel I should reduce the amount of energy I use in my home.

□ I am starting to reduce the amount of energy I use in my home.

□ I have tried to reduce the amount of energy I use in my home, but have found it hard to stick to.

□ I have reduced the amount of energy I use in my home and think I could reduce it more.

□ I have reduced the amount of energy I use in my home and cannot reduce it further

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□ I don't think it is necessary to reduce the amount of energy I use in my home because I don't see energy use as an issue.

Q3b: Please tell us more about why the statement you have chosen relates to you.

Q3c: Which of the following statements most closely relate to your water use? Tick one box only.

□ I sometimes feel I should reduce the amount of water I use in my home.

□ I frequently feel I should reduce the amount of water I use in my home.

□ I am starting to reduce the amount of water I use in my home.

□ I have tried to reduce the amount of water I use in my home, but have found it hard to stick to.

□ I have reduced the amount of water I use in my home and think I could reduce it more.

□ I have reduced the amount of water I use in my home and cannot reduce it further

□ I don't think it is necessary to reduce the amount of water I use in my home because I don't see water use as an issue.

Q3d: Please tell us more about why the statement you have chosen relates to you.

Q3e: Which of the following statements most closely relate to your waste use? Tick one box only.

□ I sometimes feel I should increase the amount of waste that I recycle

□ I frequently feel I should increase the amount of waste that I recycle

□ I am starting to increase the amount of waste that I recycle

□ I have tried to increase the amount of waste that I recycle but have found it hard to stick to.

□ I have increased the amount of waste that I recycle and think I could increase it more.

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□ I have increased the amount of waste that I recycle and cannot increase it further

□ I don't think it is important to increase the amount of waste I recycle because I don't see recycling as an issue.

Q3f: Please tell us more about why the statement you have chosen relates to you.

SECTION 4: YOUR FOOD

We would like to hear a little bit about how you make your shopping choices and the actions you undertake in your garden or even on your window sill.

Q4a: Which of the following statements most closely relate to you? Tick one box only.

□ I sometimes feel I should try to buy more locally, regionally or nationally grown products.

□ I frequently feel I should try to buy more locally, regionally or nationally grown products.

□ I am starting to buy more locally, regionally or nationally grown products.

□ I have tried to buy more locally, regionally or nationally grown products, but have found it hard to stick to.

□ I usually buy locally, regionally or nationally grown products, but could buy more

□ I usually buy locally, regionally or nationally grown products and cannot buy any more than I already do.

□ I do not feel that it is necessary to locally, regionally or nationally grown products, as I don't see buying locally grown products as an issue.

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Q4b: Please tell us more about why the statement you have chosen relates to you.

Q4c: Do you have a garden, yard, balcony or window box that you are allowed to cultivate?

□ Yes Go to question 4d

□ No Go to question 5a

Q4d: Which of the following statements most closely relate to you? Tick one box only.

□ I sometimes feel I should try to grow some of my own food.

□ I frequently feel I should try to grow some of my own food.

□ I am starting to grow some of my own food.

□ I have tried to grow some of my own food, but have found it hard to stick to.

□ I usually grow some of my own food, but could grow more.

□ I usually grow some of my own food and can't grow any more than I do now.

□ I do not feel that it is important to grow any of my own food, as I do not feel growing my own food is an issue.

Q4e: Please tell us more about why the statement you have chosen relates to you.

SECTION FIVE: IN YOUR COMMUNITY

Q5a: Which of the following statements most closely relate to you, in relation to taking an active part in helping to organize community activities or clubs, for example: neighbourhood watch, a parent and toddler session or being on the committee organising a local event?

□ I sometimes feel I should try to take an active part helping with community activities or clubs

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□ I frequently feel I should try to take an active part helping with community activities or clubs

□ I am starting to take an active part helping with community activities or clubs

□ I have tried to take an active part helping with community activities or clubs, but have found it hard to stick to

□ I usually take an active part helping with community activities or clubs

□ I usually take an active part helping with community activities or clubs, and can't take on more than I do now

□ I do not feel that it is important to take an active part helping with community activities or clubs

Q5b: Which of the following statements most closely relate to you, in relation to taking an active part in decisions about your community by, for example: commenting on council plans, taking part in council meetings, being involved in your local residents or neighbourhood meetings?

□ I sometimes feel I should try to take an active part in decisions about my community

□ I frequently feel I should try to take an active part in decisions about my community

□ I am starting to take an active part in decisions about my community

□ I have tried to take an active part in decisions about my community, but have found it hard to stick to

□ I usually take an active part in decisions about my community

□ I usually take an active part in decisions about my community, and can't take on more than I do now

□ I do not feel that it is important to take an active part in decisions about my community

Survey ends.

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Figures

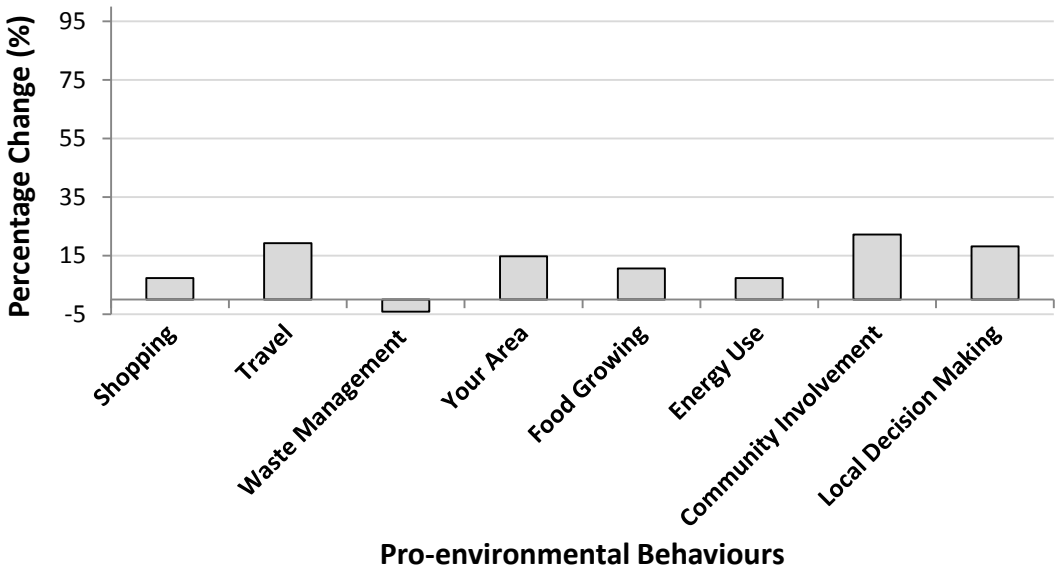

Figure 1.

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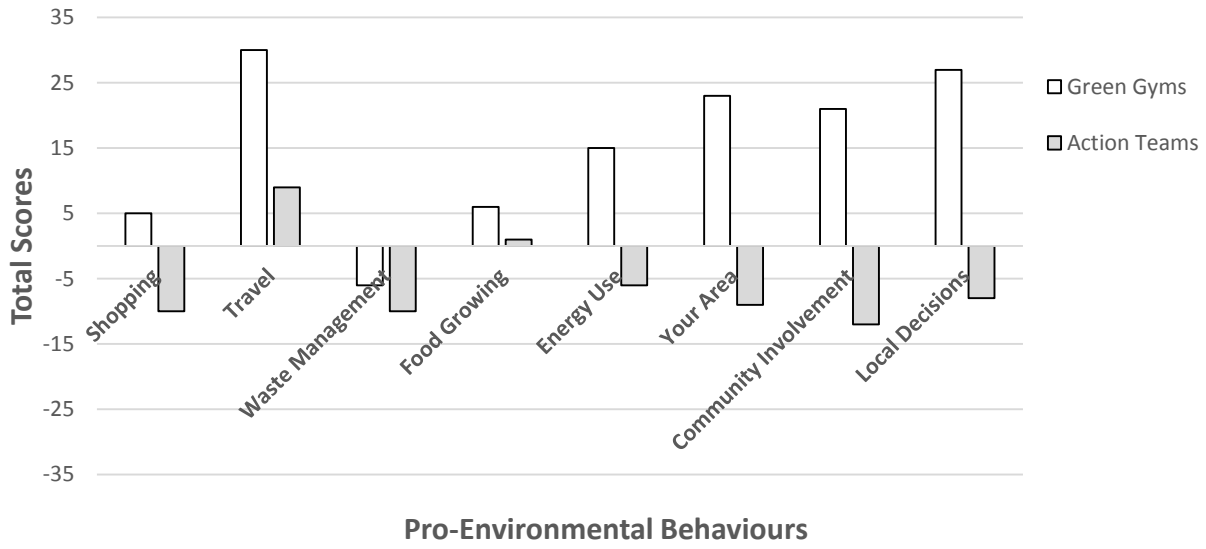

Figure 2.

Tables

Table 1.

Demographic Category	**Baseline (*n*=952)**	**1st follow-up (*n*=161)**	**2nd follow-up (n=63)**
Gender			
Female	431	74	28
Male	518	87	35
Missing	3	-	-
Age Range			
18-24	130	21	8

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25-34	287	48	19
35-44	194	32	13
45-54	151	26	9
55-64	118	19	7
65+	46	8	3
Missing	26	7	4
Ethnicity			
White British	562	95	37
Other	380	66	26
Missing	-	-	-
Deprivation (IMD[1])			
Most Deprived (0-20%)	314	53	20
21-40%	316	52	21
41-60%	141	23	9
61-80%	107	18	7
Least Deprived (81-100%)	68	11	4
Missing	6	4	2

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Table 2.

	First Survey	Second Survey	Third Survey
Mean	20.6	22.5	23.5
Median	21	22	23
1st Quartile	17	18	19
3rd Quartile	26	28	28
SD	7.5	7.8	6
Range	32	36	25

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Table 3.

Demographic Category	Shopping	Travel	Waste Management	Your Area	Food Growing	Energy Use	Community Involvement	Local Decision Making
Gender								
Female	7	15	-4	9	9	12	16	20
Male	-2	18	-3	17	3	6	3	5
Age Range								
18-24	2	-2	-1	1	0	-1	2	2
25-34	-1	0	4	4	5	-1	0	-1
35-44	1	12	1	11	3	11	8	12
45-54	5	15	-4	5	4	2	15	9
55-64	0	11	-6	1	-1	3	-8	-6
65^{+}	0	-2	2	2	3	4	0	7
Ethnicity								
White British	10	24	1	20	6	10	-5	12

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Other	-5	9	-8	6	6	8	24	13
Deprivation (IMD[1])								
Most Deprived (0-20%)	-9	14	-3	15	10	15	1	8
21-40%	0	7	2	4	0	2	3	10
41-60%	13	5	4	3	5	7	11	9
61-80%	-1	2	-4	2	-3	0	6	0
Least Deprived (81-100%)	2	1	-2	2	0	-2	2	2