The Health Benefits of the Youth Outdoor Experience (YOE) Project

Carly Wood, Rachel Hine and Jo Barton

Department of Biological Sciences,
University of Essex,
July 2011

A short report for Natural England and Suffolk Wildlife Trust
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1. Acknowledgements

The Youth Outdoor Experience (YOE) Project is currently funded by Natural England (NE) and managed by Suffolk Wildlife Trust (SWT). The research for this study was supported by Natural England and we are very grateful for all the help and support provided by SWT staff and volunteers.

The authors would especially like to thank all of the YOE participants for allowing us to share their project experiences and for generously giving up both their time and energy for the evaluation. Further thanks also go to Suffolk Wildlife Trust and Natural England for the use of their photos in this report.

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2. Executive Summary

Introduction
By 2020 depression and depression-related illness will be the second most common cause of disability in the developed world [1]. Each year approximately 20% of adolescents experience a mental health problem, most commonly anxiety or depression [2]. However, both physical activity and contact with nature are beneficial to psychological well-being, leading to improvements in self-esteem, depression and mood, and also increasing the ability of individuals to cope with stressful life events [3, 4]

Access to local green space also encourages participation in physical activity. Performing physical activity whilst in a natural environment, termed ‘Green Exercise’, has been demonstrated to lead to greater improvements in psychological well-being than physical activity alone [5]. Green Exercise improves mood, self-esteem and connectedness to nature [3, 4, 6]. Individuals who have regular contact with nature are healthier overall [7], since contact with nature is associated with longevity and a decreased risk of psychological health problems [8]. Natural settings can also help to facilitate social contact by providing opportunities to meet new people. A green space, no matter how small, encourages individuals to use outdoor space and thus increases the likelihood of social interaction [9, 10]. The higher the number of trees and vegetation in an area, the more people use it and the more time they spend within it.

Methodology
The University of Essex provided an independent monitoring and evaluation tool to assess the key outcomes of the Youth Outdoor Experience (YOE) project. The methodology was designed to provide comparative data on the well-being outcomes of participating in the 12 week YOE project including questions to assess well-being, connectedness to nature, physical activity and contact with nature. Qualitative questions were also asked for a more detailed narrative on what aspects of the project participants enjoyed and any new interests that they developed as a result of participating in the project. Questionnaires were distributed at the start, mid-point and end of the project.

Participants also completed the Soft Outcomes Universal Learning (SOUL) record, developed in order to assess the outcomes and impact of informal learning settings. All SOUL questionnaire distribution was managed by Suffolk Wildlife Trust and was independent from the University of Essex analysis. The SOUL questionnaire consisted of 20 questions, grouped under 5 subscale headings; ‘Being Healthy’, ‘Staying Safe’, ‘Enjoying and Achieving’, ‘Making a Positive Contribution’ and ‘Economic Well-being’. The SOUL questionnaire was completed at the start, mid-point and end of the twelve week YOE project.
Key Findings

University of Essex Questionnaire
A total of 18 participants completed at least one University of Essex questionnaire. The majority were male (66.6%) and the participants age range was 14.1-18.5 years. There were two groups of participants, a school group and a YMCA group.

Positive changes in well-being were observed over the course of the project. In the school group, who completed all three questionnaires, well-being increased by an index of 1.2 over the course of the project (Figure A). The YMCA group, who only completed questionnaires at the middle and end of the project, experienced a decline in well-being by an index of 1.0. However, the lack of baseline data and the small sample size (n=2) makes the interpretation of this result difficult.

Positive changes in the number of days of 30 minutes of moderate physical activity indoors were also observed over the course of the project, in both the school and YMCA group. The indexes of increase were 0.2 and 0.5 days respectively (Figure B and Figure C). In the school group, who completed all three questionnaires, indoor MPA peaked at the mid-point of the project with an index of increase of 1.2 days from the pre-score.

The number of days of 30 minutes of outdoor moderate physical activity also increased in the school group, but only from the start to the middle of the project. The index of increase was 1.4 days (Figure D). In the YMCA group outdoor MPA decreased by an index of 1.5 days. However, the recommended guidelines of 30 minutes of MPA on five or more days were achieved by the YMCA group.
group in outdoor activity at the mid-point of the project. If the figures for indoor and outdoor MPA are combined both the YMCA and school group achieve 30 minutes of MPA on five or more days.

Participants developed new interests as a result of having the opportunity to take part in the YOE project. Project leaders also noticed significant changes in participants’ attitudes and self-esteem and indicated that it had been largely beneficial to the individuals and their overall attitude and behaviour.

**SOUL Questionnaire**

One hundred and fifteen participants completed at least one SOUL Questionnaire throughout the project. Participants who completed all three questionnaires and two time points only (pre and post-project) experienced an improvement in their overall questionnaire score and their score for each sub-scale. The ‘being-healthy’ score increased by an index of 1.2 and 0.8 respectively, whilst the ‘staying safe’ score increased by an index of 0.4 and 1.1 respectively. The ‘enjoying and achieving’ score increased by an index of 0.4 for participants who completed all three questionnaires. For participants who completed pre- and post-questionnaires the index of increase was 2.0 (Figure E). A paired samples t-test revealed that this increase was significant ($t(29)=-2.99; P<0.01$). Thus, the YOE project helped participants to feel more positive about themselves and what they were achieving within their lives, perhaps through increases in self-confidence and self-esteem resulting from participation in physical activity and contact with nature [3, 11, 12].

The ‘making a positive contribution’ score increased by an index of 1.5 for participants who completed all three questionnaires and by an index of 1.2 (Figure F) for participants who completed pre- and post-questionnaires. A paired samples t-test revealed that the latter increase was statistically significant ($t(33)=-2.14; P<0.05$). Hence, the YOE project helped participants to interact...
with the environment and others on a regular basis, thus helping them to improve these relationships. The economic well-being score increased by an index of 0.3 for participants who completed all three questionnaires. However participants who only completed pre- and post questionnaires decreased their score by an index of 0.2.

The total questionnaire score increased by an index of 4.3 in participants who completed all three questionnaires (Figure G). A one-way within ANOVA revealed a significant increase in the total questionnaire score over the course of the project (F(2)= 7.51; P<0.01). Post-hoc bonferroni t-tests revealed that this difference was between the pre- and post- questionnaire score (P<0.017). For participants who only completed pre- and post- questionnaires the index of increase was 5.3 (Figure H). Paired samples t-test revealed a significant increase in the overall score (t(32)= -2.68; P<0.05).

**Conclusion**

The YOE project resulted in increases in participant well-being and indoor and outdoor physical activity, all of which are important contributors to health. Participants also felt that they were healthier, safer and had a greater economic well-being as a result of the YOE project. Statistically significant increases in how much participants enjoyed and achieved in their school and social activities were also observed. Participants also felt they were making a significant positive contribution to their home and school life and other peoples’ lives. The findings from the SOUL questionnaire are based on a much larger dataset and therefore have important implications for the design and delivery of future projects of this type. The findings from the standardised empirical University of Essex research are limited because of the small sample size, but suggest a need for more longitudinal analysis on larger groups. However, both the self-reported and observed positive changes in participants behaviour and attitude advocate a role for nature based activities in addressing some of the escalating behavioural problems.
3. Introduction

3.1 Psychological Health and Well-being

The mental health of young people in the UK is continuously declining. Each year approximately 20% of adolescents experience a mental health problem, most commonly anxiety or depression [2]. Poor mental health in youth is strongly related to low educational achievements, poor self-esteem, low self-confidence and a lack of social skills [13]. Mental ill health can have a substantial effect on quality of life and is a leading cause of disability. By 2020 depression and depression-related illness will be the second most common cause of disability in the developed world [1]. Mental ill health is a major public health issue and is estimated to cost approximately £105.2 billion a year in England [14].

3.2 Physical Activity

The health benefits of engaging in physical activity are well documented; regular participation in physical activity can reduce the risk of cardiovascular disease and the associated risk factors such as hypertension, high blood lipids and elevated blood pressure and can also reduce the likelihood of developing type II diabetes [15, 16]. Physical inactivity is one of the leading causes of death in developed countries, responsible for an estimated 22-23% of coronary heart disease, 16-17% of colon cancer, 15% of diabetes, 12-13% of strokes and 11% of breast cancer. The annual costs of physical inactivity in England are reported to be approximately £8.3 billion, excluding individuals who are obese due to inactivity, which contributes a further cost of £2.5 billion per year to the economy [17, 18]. Physical activity is also beneficial for psychological well-being and has been demonstrated to positively influence self-esteem, mood and depression and enrich quality of life[3, 19, 20].

Young people, aged 16+, are recommended to perform at least thirty minutes of moderate physical activity (MPA) on five or more days per week; whilst children and adolescents are recommended to perform at least one hour of moderate PA each day [11, 21, 22]. However, the majority of individuals are failing to meet these recommendations. In fact, in the UK only one third of adolescent girls and two thirds of adolescent boys report doing 20 minutes of MPA three times a week [23, 24]. Physical activity levels largely decrease during adolescence, with the rate of drop off being significantly greater in girls than in boys [11].
3.3 The health benefits of contact with nature

The link between nature and health is becoming increasingly recognised, with a growing body of evidence to suggest that contact with the natural environment can lead to significant improvements in mental well-being [5, 8, 25, 26]. Contact with nature has been demonstrated to reduce stress, improve attention and replenish mental fatigue [4, 27, 28]. In fact, in young people access to local green space has been demonstrated to reduce the impact of stressful life events, increase cognitive functioning and reduce behavioural disorders [29, 30]. Furthermore, there is evidence to suggest that exposure to the natural environment can enhance mood, decrease depression and increase self esteem [28, 31, 32].

Access to local green space can also encourage participation in physical activity. Individuals with easy access to nature are three times as likely to participate in physical activity and consequently 40% less likely to become overweight or obese or experience physical health problems [12, 33]. Performing physical activity whilst in a natural environment, termed ‘Green Exercise’, has also been demonstrated to lead to greater improvements in psychological well-being than physical activity alone. Green Exercise can improve mood, self-esteem and connectedness to nature[5, 8]. Individuals who have regular contact with nature are thought to be healthier overall than other individuals [7], since contact with nature is associated with longevity and a decreased risk of psychological health problems [8].

Natural settings can also help to facilitate social contact by providing opportunities to meet new people, an opportunity that is not so readily provided elsewhere in modern society [9, 34]. Modern urban ecosystems lacking space and natural settings tend to restrict social contact as individuals are not attracted to their surrounding environments and thus tend to stay indoors, away from others. A green space, no matter how small, encourages individuals to use outdoor space and thus increases the likelihood of social interaction [9, 10]. The higher the number of trees and vegetation in an area, the more people use it and the more time they spend within it.

3.4 Limitations of current evidence base

The evidence regarding the health benefits of contact with nature and participation in green exercise is growing, however much of this research has been restricted to adult populations. Evidence regarding the health benefits of nature and green exercise is largely lacking in children and adolescents. Furthermore, many studies suffer from methodological limitations such as small sample sizes, a lack of standardised, reliable and validated measures to assess changes in health parameters.
and absence of control groups [35, 36]. There are also a lack of longitudinal studies that administer follow-up measures to evaluate the long-term effects of contact with nature and participation in green exercise [37].

4. The Youth Outdoor Experience (YOE) Project

4.1 The Role of Natural England [38]
Natural England is an independent public body whose purpose is to protect and improve England’s natural environment and encourage people to enjoy and get involved in their surroundings. The research performed by Natural England extends across the United Kingdom working alongside people such as farmers, scientists, researchers and town and county planners. The aim of Natural England is to ‘create a better natural environment that covers all of our urban, country and coastal landscapes, along with all of the animals, plants and other organisms that live with us.’

4.2 The Role of Suffolk Wildlife Trust [39]
Suffolk wildlife Trust is part of a network of 47 wildlife trusts across the United Kingdom. It cares for 52 nature reserves and is a growing membership organisation with more than 25,000 members. The Suffolk Wildlife Trust works with hundreds of children and families across Suffolk every year, both at education centres and within the community. It also offers advice to landowners, helping them to manage their land for wildlife. The primary aim of the Suffolk Wildlife Trust is to ‘create a living landscape where wildlife flourishes in Suffolk’s countryside, towns and villages.’

4.3 YOE Project Overview
The YOE project is a three year youth project which is funded by Natural England and managed by Suffolk Wildlife Trust. The YOE project provides young people aged 11-18 years and lower achieving girls aged 13 years + with the opportunity to take part in structured outdoor activities in local green spaces. The participants are located in an area that has been designated an urban priority for development due to social and economic deprivation and many participants are affected by a high level of disadvantage. English is not the first language for all participants and school attainment is below the national average. Some participants have special educational needs and lack confidence and social skills. The project is based at Carlton Marshes Nature Reserve and also uses other green spaces in Lowestoft and its surrounding areas.
Each group of participants attends the YOE project for 12 weeks, with several YOE groups running at any one time. Participants engage in weekly outdoor sessions lasting for approximately 2 hours. The outdoor sessions are physical and wide ranging in nature, involving practical habitat tasks, woodland activities such as outdoor cooking and shelter building, reflective and themed activities including mapping and orienteering, surveys and sustainability activities. These structured activities aim to stimulate interest in the outdoors and increase confidence, self-esteem and general health. It is proposed that these changes will occur through increases in physical activity, increased access to local green space and the development of social bonds.

4.4 Green Exercise Research Team at the University of Essex

The Green Exercise Group involved in this small study forms part of the interdisciplinary Centre for Environment and Society (CES) at the University of Essex. There is growing empirical evidence to show that exposure to nature brings substantial mental health benefits [5, 8, 25, 40-44]. At the same time, physical activity is known to result in positive physical and mental health outcomes. Over the last 8 years at the University of Essex, we have combined these ideas into a programme of research on ‘green exercise’ and ‘green care’. These address current concerns about the adverse health effects of modern diets and sedentary lifestyles, along with growing evidence that stress and mental ill-health have become substantial health problems for many people in industrialised societies. This cross-disciplinary University of Essex project team is engaged in primary research on i) the health benefits of green exercise – investigating the mental and physical health benefits of physical activities under exposure to different rural and urban environments and ii) more recently evaluating a wide variety of green care options in varying contexts (including ecotherapy and wilderness therapy); and is currently leading research in this field [45].

4.5 Key objectives of the project

The key objectives of the YOE project were to:

- Increase physical activity levels
- Encourage participants to think about the healthiness of their diet
- Encourage participants to connect with their local environment
- Improve physical and mental health and general well-being.
- Build self-esteem and social skills
- Provide continued opportunity for participation in outdoor activity
• Learn practical conservation skills
• Mix with new people and build a new network of friends
• Gain confidence to feel comfortable in the natural world.

The aims of this evaluation were therefore:

• To provide a monitoring and evaluation tool to assess the key outcomes of the YOE project.
• To assess the impact of the YOE project on well-being, connectedness to nature and physical activity.
• To determine which aspects of the YOE project were most and least enjoyed.
• To assess the impact of the YOE project on the responses to the SOUL questionnaire [46].

5. Methodology

5.1 The University of Essex Short Composite Questionnaire

A short composite questionnaire was administered in order to obtain both quantitative and qualitative data regarding the impact of the YOE project on participants. Data was collected between September and December 2010 in two groups of subjects, a YMCA group (N=7) and a school group (N=7). Questionnaires were distributed by a YOE project co-ordinator who had been fully briefed on the process of evaluation.

The questionnaire incorporated internationally recognised and standardised tools to measure participants’ mental well-being and experience of nature. It also asked questions to determine participants’ normal level of contact with nature, indoor and outdoor physical activity levels and also the amount of time spent sitting down. Questions were also asked regarding what the participants enjoyed most about the YOE project and if they had developed any new interests since participating.

The questionnaires were administered at the initial session of the 12 week YOE project and also on the final session of the YOE project. Questionnaires were also administered at the mid point of the project. The distribution of the questionnaires at these time points allowed any changes in parameters throughout the project to be identified and also the comparison of the individuals’ response before and after participation. Therefore, any changes in parameters as a direct result of the project experience could be identified. Participants’ were asked to complete the questionnaires
individually, without discussing their answers with others. All completed questionnaires were sent to the University of Essex for independent analysis.

5.1.1 **The Warwick Edinburgh Mental Well-being Scale**

The Warwick Edinburgh Mental Well-being Scale (WEMWBS) is a relatively new measure developed by the Universities of Warwick and Edinburgh to enable the measurement of mental well-being [47]. The scale examines a wide idea of well-being, including affective-emotional aspects, cognitive evaluative dimensions and psychological functioning [47]. WEMWBS is a 14 item scale of mental well-being, in which all items are worded positively and address aspects of positive mental health [48]. The scale is scored by summing responses to each item answered on a 5 point Likert scale, from 1 (none of the time) to 5 (all of the time). The minimum scale score is 14 and the maximum is 70. A high score represents a high level of well-being.

5.1.2 **The Nature Relatedness Scale—Experience**

Nature relatedness describes an individual’s level of connectedness with the natural world and comprises the cognitive, affective, and physical connection we have with nature [49, 50]. The Nature Relatedness Scale is designed to measure an individual’s level of connectedness with the natural world. The scale has three subscales; self, perspective and experience. The experience subscale of the nature relatedness scale has been used in the composite questionnaire as it measures “a physical familiarity with the natural world and the level of comfort with and desire to be out in nature” [49].

The experience part of the nature relatedness scale consists of 6 questions, rated on a 5-point likert scale from 1 (disagree strongly) to 5 (agree strongly). Two of the questions are reverse scored. A score for the experience scale is created by adding the total score and dividing by 6. A high score indicates a high level of experience with nature[49, 50].

5.1.3 **Physical Activity Questions**

Children and adolescents are recommended to perform at least 60 minutes of MPA each day to maintain health; whilst individuals aged 16+ are recommended to perform at least 30 minutes of MPA on five or more days per week. However the majority of young people are not meeting these requirements[24]. Many organisations are keen to increase participation in physical activity. Natural England and Suffolk wildlife Trust are for this reason interested in participants’ baseline physical
activity levels and any changes that may occur as a result of participation in the YOE project. A single item measurement was therefore included to assess both indoor and outdoor physical activity. Participants were asked ‘In the past week, on how many days have you done at least 30 minutes of moderate intensity physical activity (made you breathe harder) indoors, such as PE, basketball, gymnastics etc?’ They were also asked ‘In the past week, on how many days have you done at least 30 minutes of moderate intensity physical activity (made you breathe harder) outdoors, such as brisk walking, cycling, sport, exercise and active recreation?’ These single item measures have been widely utilised since 2007 by Natural England and the British Heart Foundation in their ‘Outdoor Health Questionnaire’ used in the evaluation of the national ‘Walking the way to Health’ Programme [38, 51].

A one-off question was also asked regarding how much time participants spent sitting down, as this would directly impact upon physical activity levels. Participants were asked ‘In the past week how much time have you spent sitting? This includes time spent sitting at a desk, visiting friends, reading, travelling on a bus or sitting or lying down to watch television.’

5.2 **The Soft Outcomes Universal Learning Record [46]**

The Soft Outcomes Universal Learning (SOUL) record was developed in order to assess the outcomes and impact of informal learning settings. A series of questionnaires were designed to measure progress in different contexts with different population groups[46]. The SOUL questionnaire utilised in this project was a ‘Young Persons: Getting to Know You’ questionnaire. Questionnaires were completed between July 2008 and March 2010 and were distributed by a YOE project co-ordinator. All SOUL questionnaire distribution was managed by Suffolk Wildlife Trust independently from the University of Essex analysis. Completed questionnaires were forwarded to the University of Essex for secondary analyses.

The SOUL questionnaire consisted of 20 questions, scored on a 6 point likert scale from 1 (strongly disagree) to 6 (strongly agree). Questions were grouped under 5 subscale headings; ‘Being Healthy’, ‘Staying Safe’, ‘Enjoying and Achieving’, ‘Making a Positive Contribution’ and ‘Economic Well-being’. A score for each subscale was achieved by summing the score for each of the four questions in that subscale and a total questionnaire score was achieved by summing the scores for all 20 questions. The minimum score for each subscale was four, whilst the maximum was 24. Therefore the
The SOUL questionnaire was completed at the start and end of the twelve week YOE project and also at the mid point. The distribution of the questionnaires at these time points allowed the outcomes of the project to be assessed both after its completion and throughout. Participants’ were asked to complete the questionnaires individually, without discussing their answers with others. Completed questionnaires were sent to the University of Essex for independent analysis.

6. Results

The data analysis of the University of Essex questionnaires and the SOUL questionnaires has been completed separately. The data for each set of questionnaires has been presented as two separate sections within the results.

6.1 The University of Essex Short Composite Questionnaire

6.1.1 Participant Information

A total of 14 participants, from two groups, completed questionnaires during their time in the YOE project. Participant information is contained in Table 1.

Table 1: Group and participant information

<table>
<thead>
<tr>
<th>Group Name</th>
<th>Number of participants</th>
<th>Age (years)</th>
<th>Age range (years)</th>
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<tbody>
<tr>
<td>YMCA</td>
<td>7 (5 Male, 3 Female)</td>
<td>17.0 ± 1.4</td>
<td>14.2-18.5</td>
</tr>
<tr>
<td>School</td>
<td>7 (5 Male, 2 Female)</td>
<td>14.3 ± 0.3</td>
<td>14.1-14.8</td>
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6.1.2 School Group

I) Warwick Edinburgh Mental Well-being Scale (WEMWBS)

Five participants completed the WEMWBS at the three time points (Figure 1). The average well-being score at the start of the YOE project was 57.4 ± 10.5. The highest score was 65, whilst the lowest score was 39. The average well-being score at the mid point of the project was 56.0 ± 10.5, with a high score of 65 and a low score of 39. The average well-being score at the end of the YOE project was 58.6 ± 7.7. The lowest score was 46 and the highest was 67. A one way within ANOVA
revealed no significant difference between the well-being scores across the three time points (P>0.05). However, 60% of participants increased their well-being score over the course of the project and the index of increase was 1.2.

![Figure 1: The mean ± SD of the scores achieved on the WEMWBS over the course of the YOE project](image)

One participant in the school group only completed the WEMWBS at the pre- and mid- point of the project. The pre- well-being score was 53 and the mid- well-being score was 59, representing an increase in well-being. One participant in the school group only completed the WEMWBS pre- and post- the YOE project. The pre- score was 51 and the post- score was 42.

II) **Experience of nature**

Five participants completed the experience of nature questions at the three time points (Figure 2). The average pre- nature experience score was 4.0 ± 0.5, with a high score of 4.8 and a low score of 3.5. The average mid- nature experience score was 3.5 ± 0.3. The highest score was 3.8 and the lowest was 3.0. The average post- nature experience score was 3.2 ± 0.3, with a high score 3.7 and a low score of 1.7. A one way within ANOVA revealed no significant difference between the scores achieved at the three time points (P>0.05). All subjects decreased their nature experience score over the course of the YOE project, indicating that they became less connected to nature. The score decreased by an index of 0.8.
One participant in the school group only completed the nature experience questions pre- and mid- the YOE project. Both the pre- and mid- nature experience scores were 3.3. One participant only completed the nature experience questions pre- and post- the YOE project. The pre- score was 4.3 and the post- score was 1.7.

III) **Contact with Nature**

Participants were asked how much contact they normally have with nature and greenspace. Participants could respond by selecting either, ‘daily’, ‘2-3 times a week’, ‘once a week’, ‘once a fortnight’, ‘once a month’, ‘once every six months’, ‘once a year or less’ or ‘none, I have never had the opportunity’. A total of 7 participants responded to the question prior to the start of the YOE project. The majority of participants (42.9%) reported that they had contact with nature 2-3 times a week (Figure 3), whilst only 14.3% had daily contact with nature.
A total of 6 participants completed the contact with nature question at the mid-point of the YOE project. 50% of participants reported having contact with nature daily, a 35.7% increase from the pre-sampling point (Figure 4).

Six participants completed the contact with nature question at the end of the YOE project. 33.3% of participants reported having daily contact with nature, an 18.7% increase from the pre-project percentage (Figure 5). 33% of participants also reported having contact with nature once a week; this was also an increase from the pre-percentage.
IV) Indoor Physical Activity

Participants were asked on how many days in the previous week they performed moderate physical activity indoors for at least 30 minutes. A total of five participants completed the MPA indoor question at all three time points (Figure 6). The average number of days on which participants performed 30 minutes of indoor MPA prior to the YOE project was $2.4 \pm 1.5$. The fewest number of days a participant performed indoor MPA was 1 and the largest number of days was 4. The average number of days on which participants performed 30 minutes of indoor MPA at the midpoint of the YOE project was $3.6 \pm 2.6$. The fewest number of days was 1 and the greatest was 7. The average number of days a participant performed 30 minutes indoor MPA at the end of the YOE project was $2.6 \pm 1.8$. The largest number of days was 5 and the fewest number of days was 1. A one way within ANOVA revealed no significant difference between the number of days spent performing MPA indoors across the three time points ($P>0.05$). The number of days spent performing 30 minutes of indoor MPA increased by an index of 1.2 from pre- to mid- project, but decreased by 1.0 from mid- to post- project. The overall index of increase from pre- to post- project was 0.2. 40% of participants increased the number of days of 30 minutes of indoor MPA from the start to the end of the YOE project.
One participant in the school group only completed the indoor MPA question pre- and mid- the YOE project. The number of days of indoor MPA pre- and mid- the YOE project was 6 days. One participant only completed the indoor MPA question pre- and post- the YOE project. The pre- score was 4 days and the post- score was 6 days, representing an increase in the number of days of indoor MPA.

V) Outdoor Physical Activity

Participants were asked on how many days in the previous week they performed 30 minutes of moderate physical activity outdoors. A total of five participants completed the outdoor MPA at all three time points (Figure 7). The average number of days spent outdoors performing at least 30 minutes of MPA prior to the YOE project was 3.2 ± 2.8. The fewest number of days was 0 and the greatest was 7. The average number of days spent performing 30 minutes of outdoor MPA at the mid- point of the YOE project was 4.6 ± 1.5. The fewest number of days was 3 and the greatest was 6. The average number of days spent performing 30 minutes of outdoor MPA at the end of the YOE project was 2.6 ± 2.1. The greatest number of days was 6 and the least was 1. A one way within ANOVA revealed no significant difference in the time spent performing 30 minutes of outdoor MPA across the three time points (P>0.05). The number of days spent performing 30 minutes of MPA outdoors increased by an index of 1.4 from pre-to mid- YOE project, but decreased by an index of 2.0 from mid- to post-. The index of change from pre- to post- was -0.6. 40% of participants increased the number of days spent performing 30 minutes of outdoor MPA from pre- to post- the YOE project.
Figure 7: The mean ± SD of the number of days of outdoor MPA over the course of the YOE project

One participant in the school group only completed the outdoor MPA question pre- and mid- the YOE project. The number of days of outdoor MPA at the pre- sampling point was 4. The number of days of outdoor MPA at the mid- point of the project was 5, representing an increase in outdoor MPA. One participant only completed the outdoor MPA question pre- and post- the project. The number of days pre- was 6 and the number of days post- was 7. This also represents an increase in outdoor MPA.

VI) Time spent sitting

Participants were asked how much time they spent sitting in the previous week. A total of four participants completed the ‘sitting time’ question at all three time points throughout the YOE project (Figure 8). The average time spent sitting prior to the YOE project was 21.0 ± 9.3 hours. The shortest time was 12 hours and the longest time was 30 hours. The average time spent sitting at the mid- point of the YOE project was 22.6 ± 24.1 hours. The longest time spent sitting was 49 hours and the shortest time was 1.4 hours. The average post- sitting time was 28.3 ± 19.3 hours. The shortest sitting time was 12 hours and the longest was 56 hours. One way within ANOVA revealed no significant difference between the time spent sitting at the three time points (P>0.05). Over the course of the project the sitting time increased by an index of 7.3 hours. However 50% of participants decreased their sitting time over the course of the project.
Figure 8: The mean ± SD of the time spent sitting over the course of the YOE project

One participant only completed the sitting time questions pre- and post- the YOE project. The time spent sitting prior to the YOE project was 30 hours. The time spent sitting post- the YOE project was 40 hours, representing an increase in the time spent sitting down.

6.1.3 YMCA group

i) Warwick Edinburgh Mental Well-being Scale (WEMWBS)
Two participants completed the WEMWBS at the mid- and post- testing points. The average mid-WEMWBS score was 51.0 ± 17.0 (Figure 9). The highest score was 63 and the lowest score was 39. The average post-score was 50.0 ± 12.7. The lowest score was 41 and the highest was 59. A paired samples t-test revealed no significant difference between the mid- and post- well-being score (P>0.05). The well-being score decreased by an index of 1.0. However, 50% of participants increased their score.
Figure 9: The mean ± SD of scores achieved on the WEMWBS mid- and post- the YOE project

Four subjects completed the well-being scale at the mid-point of the YOE project. The average score was 54.3 ± 9.6. The lowest score was 41 and the highest score was 64. Two subjects completed the scale post- the YOE project. The average score was 57.5 ± 17.7. The highest score was 70 and the lowest score was 45.

ii) Experience of Nature
Two participants completed the experience of nature questions mid- and post- the YOE project. The average mid- nature experience score was 3.7 ± 0.2 (Figure 10). The highest score was 3.7 and the lowest score was 3.7. The average post- nature experience score was 3.0 ± 1.0. The highest score was 3.7 and the lowest was 2.3. A paired samples t-test revealed no significant difference between the mid- and post- nature experience score (P>0.05). The score decreased by an index of 0.7. 50% of participants did not change their score.
Four subjects completed the nature experience questions at the mid-point of the YOE project. The average score was $3.2 \pm 1.0$. The highest score was 4.3 and the lowest score was 2.0. Only one subject completed the nature experience questions post- the YOE project. The score achieved was 2.7.

### iii) Contact with nature

Six subjects completed the contact with nature question at the mid-point of the YOE project. 33.3% of participants reported having contact with nature ‘daily’ and ‘once a week’ (Figure 11). Four subjects completed the contact with nature question at the end of the YOE project. 75% of participants reported having contact with nature ‘2-3 times a week’ (Figure 12).
iv) **Indoor Physical Activity**

Participants were asked on how many days in the previous week they performed moderate physical activity (MPA) indoors for at least 30 minutes. Two participants completed the indoor MPA question mid- and post- the YOE project. The average number of days of 30 minute of indoor MPA at the mid-point of the YOE project was $4.0 \pm 4.2$ (Figure 13). The highest number of days was 7 and the lowest was 1. The average number of days of indoor MPA at the end of the YOE project was $4.5 \pm 2.1$. The highest number of days was 6 and the lowest was 3. A paired samples t-test revealed no significant
difference between the mid- and post- scores (P>0.05). The average score increased by an index of 0.5 and 50% of participants increased the number of days they performed indoor MPA by the end of the project.

![Figure 13: The mean ± SD of the number of days of indoor MPA mid- and post- the YOE project](image)

Four participants completed the indoor MPA question at the mid- point of the YOE project. The average score was 4.0 ± 3.5. The highest score was 7 and the lowest score was 1. Only one subject completed the post- indoor MPA question. The number of days of indoor MPA was 3.

v) Outdoor Physical Activity
Participants were asked on how many days in the previous week they performed 30 minutes of moderate physical activity outdoors. Two participants completed the outdoor MPA question mid- and post- the YOE project. The average number of days spent performing outdoor MPA at the mid-point of the YOE project was 5.0 ± 2.8 (Figure 14). The highest number of days was 7 and the lowest was 3. The average number of days of outdoor MPA post the YOE project was 3.5 ± 2.1. The lowest number of days was 2 and the highest was 5. A paired samples t-test revealed no significant difference between the mid- and post scores (P>0.05). The average number of days of outdoor MPA decreased by an index of 1.5, all participants decreased their outdoor MPA.
Four participants completed the outdoor MPA question at the mid-point of the YOE project. The average score was 4.5 ± 2.6. The highest number of days was 7 and the lowest was 1. One participant completed the outdoor MPA question at the end of the YOE project. The participant performed outdoor MPA on 4 days.

vi) Time spent sitting

Participants were asked how much time they spent sitting in the previous week. One participant completed the questions regarding the time spent sitting down mid- and post- the YOE project. The average number of hours spent sitting mid- and post-point was 12.5 hours. Two participants only completed the time spent sitting question at the mid-point of the YOE project. The average score was 16.3 ± 5.3 hours. The longest time spent sitting was 20 hours and the shortest was 12.5 hours. One participant completed the time spent sitting question post- the YOE project. The time spent sitting was 7 hours.

6.1.4 Participant Experience of the YOE project

Participants were asked several questions regarding their experience in the YOE project, including what they were looking forward to and any new interests as a result of participation. Participants commonly reported looking forward to ‘getting out into wildlife’, ‘participating in new activities’ and ‘being away from school’. At the end of the project participants said that they had enjoyed many
aspects of the project but especially trying new activities and being in nature with friends. Several participants also developed new interests as a result of the project such as canoeing, kite flying and cooking.

Box 1: What participants were looking forward to in the YOE project

| - Seeing the Wildlife               | - Going into the marshes      |
| - Getting out into the open         | - Walking around in nature    |
| - Cooking                          | - The activities              |
| - Being out of school              | - Everything                 |

“I am excited about seeing the wildlife and getting out into the open”

“Going into the marshes and walking around nature”

Box 2: What participants enjoyed most about the YOE project

| - Trying new foods                 | - Being active                |
| - Participating in the activities  | - Going out into the woods     |
| - Doing new sports and activities  | - Getting involved in everything and having the opportunity |
| - Doing new things                 | - Getting out of school       |
| - Weed clearing                    | - Being with friends          |
| - Seeing the animals               | - Meeting new people          |
| - Getting out into wildlife        | - The beach                   |
| - Getting dirty                    | - Playing rounders            |
| - Looking at nature                | - Everything                 |

“I like getting out into wildlife and getting active”

“I love being there, its something new to me because I have never been here before”

“Getting involved in everything and having the opportunity with stuff”
“Being with friends and meeting new people”

Box 3: New interests developed as a result of the YOE project

- Trying new food
- Power Kite flying
- Digging in the dirt
- Boarding and swimming in the sea
- Cutting trees
- Going outside
- Getting dirty
- Going to new places
- Looking at birds
- Canoeing
- Kayaking
- Making things
- Rounders
- Building

“I have never been near a cow before and I loved every bit of it. I don’t know what I like about it, its everything”

“I enjoy going out more”

“I am getting more interested and I am enjoying the country and having fun doing new things”

Project leaders were also asked about the young peoples experience of the YOE project. Many project leaders commented that they had seen significant changes in the young peoples behaviours and attitudes and that many of the activities were very beneficial for the young people.

Box 4: Changes in young peoples behaviour and attitudes

- More aware of their local environment
- More self confident
- Working better as a team
- Sharing their experiences
- More focused in school
- More Sociable
- Increased self-esteem
- Greater awareness of the feelings of others
- Greater knowledge of healthy eating
- Happier
- More positive attitude
Box 5: Most/Least successful activities for participants

<table>
<thead>
<tr>
<th>Most Successful Activities</th>
<th>Least Successful Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Cooking</td>
<td>- Weed Clearing</td>
</tr>
<tr>
<td>- Beach and Woodland walking</td>
<td>- Paper work</td>
</tr>
<tr>
<td>- Talks</td>
<td>- Bird ringing</td>
</tr>
<tr>
<td>- Canoeing</td>
<td>- Owl boxes</td>
</tr>
<tr>
<td>- Kite making sessions</td>
<td>- Orienteering</td>
</tr>
<tr>
<td>- Shelter building</td>
<td></td>
</tr>
</tbody>
</table>

6.2 The SOUL Questionnaire

6.2.1 Aggregate Scores for the SOUL Questionnaire

Table 2: The mean ± SD of scores achieved on the SOUL questionnaire at all three sampling time points

<table>
<thead>
<tr>
<th></th>
<th>Pre Score</th>
<th>N</th>
<th>Mid Score</th>
<th>N</th>
<th>Post Score</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Being Healthy</td>
<td>17.2 ± 4.1</td>
<td>112</td>
<td>17.6 ± 4.4</td>
<td>29</td>
<td>17.9 ± 4.7</td>
<td>65</td>
</tr>
<tr>
<td>Staying Safe</td>
<td>20.6 ± 3.0</td>
<td>114</td>
<td>21.3 ± 4.1</td>
<td>28</td>
<td>20.7 ± 3.4</td>
<td>66</td>
</tr>
<tr>
<td>Enjoying and Achieving</td>
<td>18.6 ± 3.6</td>
<td>113</td>
<td>19.4 ± 4.4</td>
<td>29</td>
<td>19.2 ± 3.8</td>
<td>64</td>
</tr>
<tr>
<td>Making a positive contribution</td>
<td>18.4 ± 3.8</td>
<td>111</td>
<td>19.4 ± 4.6</td>
<td>28</td>
<td>18.9 ± 3.9</td>
<td>64</td>
</tr>
<tr>
<td>Economic Well-being</td>
<td>19.4 ± 3.8</td>
<td>115</td>
<td>20.0 ± 5.1</td>
<td>29</td>
<td>19.2 ± 3.9</td>
<td>64</td>
</tr>
<tr>
<td>Total Questionnaire Score</td>
<td>94.0 ± 13.0</td>
<td>107</td>
<td>97.4 ± 19.6</td>
<td>28</td>
<td>96.1 ± 15.2</td>
<td>60</td>
</tr>
</tbody>
</table>

6.2.2 Being Healthy

Participants were asked four questions within the SOUL questionnaire regarding how healthy they were.
i) **Completion of the questions at all three time points**

A total of 28 participants completed the SOUL questionnaire at all three time points. The average pre-‘being healthy’ score was 16.9 ± 4.0 (Figure 15). The lowest pre- score was 8 and the highest was 23. The average mid-‘being healthy’ score was 17.5 ± 4.5, with a high score of 24 and a low score of 8. The average post-‘being healthy’ score was 18.1 ± 4.9. The highest score post- was 24 and the lowest was 7. A one way within ANOVA revealed no significant change in the ‘being healthy’ score over the three time points (P>0.05). The ‘being healthy’ score increased by an index of 1.2, 64.3% of participants increased their ‘being healthy’ score.

![Figure 15: The mean ± SD of scores achieved on the ‘Being Healthy’ Scale over the course of the project](image)

ii) **Completion of the questions at two time points**

A total of 35 participants completed the ‘being healthy’ questions pre- and post- the YOE project (Figure 16). The average pre- ‘being healthy’ score was 16.7 ± 3.9. The lowest score was 8, whilst the highest score was 23. The average post- ‘being healthy’ score was 17.5 ± 4.6. The highest score was 24 and the lowest was 8. A paired samples t-test revealed no significant difference in the pre- and post- ‘being healthy’ scores (P>0.05). However the ‘being healthy’ score increased by an index of 0.8 and 60% of participants increased their ‘being healthy score’. 
### Figure 16: The mean ± SD of scores achieved on the ‘Being Healthy’ scale pre- and post- the YOE project

#### iii) Completion of questions at one time point

Several participants only completed the ‘being healthy’ questions at one time point. Forty nine participants only completed the pre- ‘being healthy’ questions and two participants only completed the post- ‘being healthy’ questions. The average pre- ‘being healthy’ score was $17.8 \pm 4.4$, with a highest score of 24 and a lowest score of 8. The average post- ‘being healthy’ score was $21.0 \pm 0.0$. Both participants scored 21.

#### 6.2.3 Staying Safe

Participants were asked four questions about how safe they felt within their home and school environments.

#### i) Completion of the questions at all three time points

A total of 27 participants completed the ‘staying safe’ scale at all three time points. The average pre-score was $20.9 \pm 3.2$ (Figure 17). The highest score was 24 and the lowest was 12. The average mid-‘staying safe’ score was $21.3 \pm 4.2$. The highest score was 24 whilst the lowest was 6. The average post- ‘staying safe’ score was $21.3 \pm 2.8$. The lowest post- ‘staying safe’ score was 15 and the highest was 24. A one way within ANOVA revealed no significant difference in the ‘staying safe’ score over the three time points ($P>0.05$). The index of increase for the ‘staying safe’ score was 0.4 and 37% of participants increased their score.
ii) Completion of the questions at two time points

A total of 37 participants completed the ‘staying safe’ questions pre- and post- the YOE project. The average pre- ‘staying safe’ score was 19.0 ± 2.9 (Figure 18). The highest ‘staying safe’ score was 24 and the lowest was 13. The average post- ‘staying safe’ score was 20.0 ± 3.8. The highest score was 24 and the lowest score was 8. A paired samples t-test revealed no significant difference between the pre- and post- ‘staying safe’ score (P>0.05). However the score increased by an index of 1.1 and 54% of participants increased their score.
iii) **Completion of the questions at one time point**

Forty eight participants only completed the ‘staying safe’ questions prior to the YOE project. The average pre-score was 21.6 ± 2.4. The highest score was 24 whilst the lowest was 15.

### 6.2.4 Enjoying and Achieving

Participants were asked four questions about how much they enjoyed and achieved from their school and social activities.

i) **Completion of the questions at all three time points**

A total of 28 participants completed the ‘enjoying and achieving’ scale at all three time scales throughout the YOE project. The average pre- ‘enjoying and achieving’ score was 19.4 ± 3.7. The lowest pre-score was 11 and the highest was 24 (Figure 19). The average ‘enjoying and achieving’ score at the mid-point of the YOE project was 19.4 ± 4.5. The highest score was 24 and the lowest score was 4. The average post-score was 19.9 ± 3.6. The highest post-score was 24 and the lowest was 12. One way within ANOVA revealed no significant change in the ‘enjoying and achieving’ score over the three sampling points (P>0.05). The score decreased by an index of 0.7 from pre- to mid-, increased by 0.50 from mid- to post- and by 0.4 from pre- to post-project. 46.4% of participants increased their ‘enjoying and achieving’ score over the course of the YOE project.
ii) Completion of the questions at two time points

A total of 30 participants completed the ‘enjoying and achieving’ questions pre- and post- the YOE project. The average pre- ‘enjoying and achieving’ score was 16.8 ± 3.3, the highest score was 22 and the lowest score was 9 (Figure 20). The average post- ‘enjoying and achieving’ score was 18.8 ± 3.9. The highest post- score was 24 and the lowest was 11. A paired samples t-test revealed a significant increase in the ‘enjoying and achieving’ score from pre- to post- (t(29)=-2.99; P<0.01). The mean score increased by an index of 2.1 and 60% of participants increased their score.
37

Figure 21: The mean ± SD of scores achieved on the ‘Enjoying and Achieving’ scale pre- and post-the YOE project (* represents a significant increase in the ‘enjoying and achieving’ score (P<0.01))

iii) Completion of the questions at one time point

Fifty participants only completed the pre- ‘enjoying and achieving’ questions. The average pre- score was 19.3 ± 3.4. The highest score was 24 and the lowest was 12.

6.2.5 Making a Positive Contribution

Participants were asked four questions regarding how much of a positive contribution they felt they made to the environment, home life and other people around them.

i) Completion of questions at all three time points

A total of 26 participants completed the ‘making a positive contribution’ scale at all three sampling points. The average pre- score was 19.0 ± 3.8, with a maximum score of 24 and a minimum score of 10 (Figure 22). The average mid- ‘making a positive contribution’ score was 19.2 ± 4.7. The highest score was 24 and the lowest was 4. The average post- score was 20.5 ± 2.8. The maximum score achieved was 24 and the minimum was 15. One way within ANOVA revealed no significant difference between the ‘making a positive contribution’ score across the 3 time points (P>0.05). The score increased by an index of 1.5 from pre- to post- sampling points and 50% of participants increased their score.
iii) Completion of the questions at two time points

A total of 34 participants completed the ‘making a positive contribution’ questions pre- and post-the YOE project. The average pre- score was 16.4 ± 3.7, the highest score was 23 and the lowest score was 7 (Figure 23). The average post- ‘making a positive contribution’ score was 17.6 ± 4.5. The highest score achieved was 24 and the lowest was 8. A paired samples t-test revealed a significant increase in the ‘making a positive contribution’ score from pre- to post- the YOE project (t(33)= -2.14; P<0.05). The mean score increased by an index of 1.2 and 61.8% of participants increased their ‘making a positive contribution’ score.
iii) Completion of the questions at one time point

Forty seven participants only completed the pre- ‘making a positive contribution’ questions. The average score was 19.5 ± 3.4. The highest score was 24 and the lowest was 8.

6.2.6 Economic Well-being

Participants were asked four questions regarding their economic well-being. A total of 115 participants completed the pre- ‘economic well-being’ scale.

i) Completion of the questions at all three time points

A total of 27 participants completed the ‘economic well-being’ scale at all three time points. The average pre- ‘economic well-being’ score was 19.6 ± 3.8 (Figure 24). The maximum score achieved was 24 and the minimum was 12. The average mid-score was 19.7 ± 5.2, with a high score of 24 and a low score of 4. The average post- ‘economic well-being’ score was 19.9 ± 3.7. The maximum score achieved was 24 and the minimum was 10. A one way within ANOVA revealed no significant difference between the ‘economic well-being’ score at the three time points (P>0.05). The score increased by an index of 0.3 and 51.9% of participants increased their ‘economic well-being’ score.
Figure 24: The mean ± SD of scores achieved on the ‘Economic Well-being’ scale over the course of the YOE project

ii) Completion of the questions at two time points

A total of 35 participants completed the ‘economic well-being’ questions pre- and post- the YOE project. The average pre- score was 18.8 ± 3.0, with a high score of 24 and a low score of 12 (Figure 25). The average post- ‘economic well-being’ score was 18.6 ± 4.1. The lowest score achieved was 11 and the highest score was 24. A paired samples t-test revealed no significant different between the pre- and post- ‘economic well-being’ scores (P>0.05). The score decreased by an index of 0.2 from pre- to post. However, 45.7% of participants increased their ‘economic well-being’ score over the course of the project.
iii) **Completion of the questions at one time point**

Fifty three participants only completed the pre- ‘economic well-being’ questions. The average pre-score was $19.5 \pm 4.2$. The highest score was 24 and the lowest was 6.

### 6.2.7 Total SOUL Questionnaire Score

The 20 questions on the SOUL questionnaire were summed to provide an overall SOUL questionnaire score.

i) **Completion of the questionnaire at all three time points**

A total of 25 participants completed the entire SOUL questionnaire at all the three time points. The average pre-questionnaire score was $94.9 \pm 13.5$ (Figure 26). The highest score was 114 and the lowest was 73. The average mid-point questionnaire score was $97.0 \pm 20.6$. The maximum score achieved was 120 and the minimum was 57. The average post-questionnaire score was $99.2 \pm 14.5$. The lowest score achieved was 71 and the highest was 120. A one way within ANOVA revealed a significant difference between the questionnaire scores at the three sampling points ($F(2)= 7.51; P<0.01$). Post Hoc Bonferroni t-tests revealed that this difference was between the pre- and post-questionnaire score ($P<0.017$). The total score increased by an index of 4.3.
**Figure 26:** The mean ± SD of the overall scores achieved on the SOUL questionnaire over the course of the YOE project (* represents a significant increase in the total questionnaire score from pre to post (P<0.017))

**ii) Completion of the total questionnaire at two time points**

A total of 33 participants completed the total questionnaire pre- and post- the YOE project. The average pre- questionnaire score was 88.7 ± 11.9 (Figure 27). The highest questionnaire score was 105 and the lowest was 64. The average post- questionnaire score was 94.0 ± 15.9. The lowest questionnaire score was 58 and the highest was 120. A paired samples t-test revealed a significant increase in the total questionnaire score (t(32)= -2.68; P<0.05). The total questionnaire score increased by an index of 5.3 and 63.6% of participants increased their total questionnaire score.
iii) Completion of the total questionnaire at one time point

Forty five participants only completed the SOUL questionnaire at the pre-time point. The average score was 97.0 ± 13.1. The highest questionnaire score was 120 and the lowest was 82.

7. Key Findings

The following section provides an overview of the effects on participants as a result of taking part in the YOE project. The effects are discussed separately for both the University of Essex and SOUL questionnaires.

7.1 University of Essex Questionnaire

In total 14 participants took part in the YOE evaluation. The majority were male (66.7%) and aged 14.1-18.5 years. The questionnaire was designed to evaluate the changes in participants' well-being, connection to nature, contact with nature and physical activity levels. The effects of participants were assessed over time, at the start, middle and end of the project. The results for those participants in the school group who completed all questionnaires and those in the YMCA group who completed the mid- and post- questionnaires are evaluated in the following section.
7.1.1 Well-being

The YOE project resulted in increases in well-being. Participants in the school group, who completed all three questionnaires, increased their well-being from the start to end of the project, with 60% of participants increasing their overall score. Two participants only in the YMCA group completed the questionnaire at the middle and end of the project. One participant experienced an increase and the other a decrease in their wellbeing scores. The limited number of participants obviously has a large effect on the mean score.

The YOE project facilitates contact with nature which contributes to increases in well-being. This finding is supported by a number of studies that show contact with nature provides mental well-being benefits [5, 8, 25, 26]. Improving well-being in adolescents is particularly important in light of the rising trend in mental ill-health. Poor mental well-being is linked to self-destructive behaviour such as violence and crime, alcohol and drug abuse, anti-social behaviour aggression, underachievement at school, leaving school early, poor academic achievement, delinquency and fewer economic prospects [52].

7.1.2 Nature

In both the YMCA and school group the ‘experience of nature’ score decreased at all sampling points throughout the YOE project. Participants therefore enjoyed experiencing nature less as the project continued and became less connected to it. All participants in the school group and 50% of participants in the YMCA group decreased their experience of nature over the course of the project. The remaining 50% of participants in the YMCA group did not change their score. The finding that participant relatedness to nature decreased over the course of the YOE project is in contrast to studies in adults that have identified that contact with natural environments can increase connectedness to nature [53]. However, in today’s increasingly urbanised society adolescents have very little opportunity to interact with nature. Adolescents spend significantly less time exploring nature than previous generations and have become disconnected as a consequence [7, 54, 55].

Participants contact with nature varied greatly over the course of the YOE project. In the school group the percentage of participants having contact with nature on a daily basis increased from pre- to mid- (approx. 35%) and pre- to post (approx, 19%). Furthermore the percentage of participants having contact with nature weekly also increased across the three time points. However, daily
contact with nature decreased from the middle to the end of the project, and the percent of participants having no contact with nature decreased from the start to the middle and start to the end of the YOE project. In the YMCA group the percentage of participants whom had daily contact with nature decreased by 33% to none, by the end of the project. The percentage of participants who had no contact with nature also increased by 25%. However, those participants having contact with nature 2-3 times a week increased by 75% from the middle to the end of the project. The variation in contact with nature could be attributed to weather conditions. Data was collected between September and December, months where weather conditions can vary greatly. Particularly adverse weather conditions may have deterred participants from going out into nature and thus impacted on their response to the contact with nature question. This variation in response to the nature access question may also influence the ‘experience of nature’ score. The findings imply that even though the participants were having more regular direct contact with nature during their YOE sessions, this did not improve their experience of nature.

7.1.3 Physical Activity

Participants were asked on how many days in the previous week they performed thirty minutes of MPA indoors. The school group increased their number of days from the start to middle of the project and also from the start to the end by an index of 1.2 and 0.2 days respectively. The YMCA group also increased the number of days of 30 minutes of MPA, by an index of 0.5 days. 50% of participants increased the number of days of 30 minutes of MPA. The YMCA group, who have a mean age of 17.0 ± 1.4 years, are recommended to perform only 30 minutes of MPA on five or more days per week. However, this recommendation was not achieved by indoor activity at either of the sampling points. Though the number of days of MPA was 4.0 and 4.5 at the middle and end of the project respectively, the results indicate that the YMCA group are not performing sufficient PA. The school group, who have a mean age of 14.3 ± 0.3 years, are recommended to perform at least one hour of MPA every day of the week. This cohort were not meeting the recommended guidelines from indoor PA at any point during the project. At the middle of the project participants only reported performing 3.6 days of MPA and this was only for 30 minutes in duration.

Participants were also asked on how many days in the previous week they performed 30 minutes of outdoor MPA. The school group increased their outdoor MPA by 1.4 days from the start to middle of the project but decreased the number of days from the start to end and middle to end. The YMCA group decreased the number of days of 30 minutes of outdoor MPA by 1.5 days from mid- to post.
50% and 40% of participants in the YMCA and school group respectively increased their outdoor MPA over the course of the project. The recommendation of 30 minutes of MPA on five or more days was achieved by the YMCA group in outdoor activity at the mid point of the project, with a mean of 5.0 days, but decreased thereafter. The school group, who should be performing 60 minutes of MPA everyday, did not even achieve 30 minutes on five days according to their outdoor PA. The closest was 4.6 days, which was achieved at the middle of the project.

If the figures for indoor and outdoor MPA are combined both the YMCA and school group achieve 30 minutes of MPA on five or more days. Furthermore, it is possible that the school group may be close to reaching the required daily 60 minutes of MPA. Both indoor and outdoor PA can sufficiently contribute to PA levels in young people. However, neither alone can provide sufficient PA to meet recommendations.

7.1.4 Participant Experience of the Project

The participants’ experience of the project, on the whole, was largely positive. Participants reported that they were looking forward to many aspects of the project prior to its onset and indicated that they had enjoyed many aspects of the overall experience. Furthermore, several participants also developed new interests as a result of having the opportunity to take part in them throughout their time in the YOE project. Project leaders also noticed significant changes in participants’ attitudes and self-esteem and indicated that it had been largely beneficial to the individuals and their overall attitude and behaviour.

7.1.5 Study Limitations

There are several limitations which may have limited the effectiveness of this study. Firstly, the very small sample sizes and low number of questionnaires completed at all three time points throughout the project resulted in a lack of statistically significant changes in health or well-being parameters. Furthermore, the lack of consistency in the time points at which the questionnaires were distributed limits the reliability of the data, as some groups were already fully established prior to the start of the University of Essex analysis. The parameters may also have been affected by factors such as weather, stressful life events and other such factors which were independent of participation in the YOE project. Weather may have been a big problem, as poor weather conditions can affect an
individual’s mood and attitude and therefore largely impact on the questionnaire results. This is especially a problem, as the distribution of questionnaires did not occur at the same time for each group. Furthermore, participants may not have responded honestly to the questions and may have provided the answers that they perceived as the desired response as opposed to revealing their honest feelings. This could have affected the reliability of the baseline measures especially. The use of recall questionnaires to assess physical activity behaviour is also problematic as responses are often overestimated.

7.2 The SOUL Questionnaire

At total of 115 participants completed the SOUL questionnaire. Approximately 28 participants completed the questionnaire at all 3 time points and 64 completed the questionnaire at two time points (pre and post). The SOUL questionnaire comprised four questions assessing how healthy participants felt. Participants who completed the ‘being healthy’ questions at both two and three time points experienced an increase in their score over the course of the project. Participants felt that they were healthier as a result of participating in the YOE project, a feeling that may be attributed to the increased level of contact with nature and greater participation in physical activity [17, 18].

There were four questions on the SOUL questionnaire to assess how safe participants felt within their local areas and lives. The ‘staying safe’ score increased for all participants; however those participants who completed pre- and post-questionnaires experienced a greater increase than those who had completed the questions at all 3 time points. The YOE project helped participants to feel that they were safer within their local environments, perhaps as a result of an increased level of contact and time spent within their local communities throughout the project.

Four questions were utilised to assess how much participants enjoyed and achieved from the school and social activities. The ‘enjoying and achieving’ score increased over the course of the project whether completed at two or three time points. However, the increase in the enjoying and achieving score for participants who only completed two questionnaires was statistically significant. The YOE project helped participants to feel more positive about themselves and what they were achieving.
within their lives, perhaps through increases in self-confidence and self-esteem resulting from participation in physical activity and contact with nature [3, 11, 12, 19, 33].

Participants were asked four questions regarding how much of a positive contribution they felt they made to the environment, home life and other people around them. Those participants who completed the ‘positive contribution’ questions at all 3 time points increased their score by an index of 1.5 over the course of the project. Those who completed the questions pre- and post- the YOE project significantly increased their score by an index of 1.2. 61.8% of participants increased their ‘making a positive contribution’ score. The majority of participants increased their ‘making a positive contribution score’ and a large number of participants felt that they were making a significantly greater contribution to the environment, other people and their home life. The YOE project helped participants to interact with the environment and others on a regular basis, thus helping them to improve these relationships.

Participants were asked four questions to assess their economic well-being. Participants who completed the questions at all three time points increased their score, whilst participants who only completed the questions pre- and post- the project, decreased their economic well-being score. However 45.7% of participants still increased their score. A large number of participants felt that they had a greater level of economic well-being as a result of participating in the YOE project.

The SOUL questionnaire consisted of 20 questions, four for each of the scales. The total questionnaire score significantly increased in participants who answered the questionnaire at both two and three time points. Statistical analysis showed that biggest positive changes were seen between the start and end of the project. The YOE project caused participants to feel healthier, safer and more positive with regards to their school, home and social lives. It also increased how much individuals felt they were achieving. All aspects of the SOUL questionnaire improved as a result of the YOE project.

The YOE project resulted in increases in participant well-being and indoor and outdoor physical activity, all of which are important contributors to health. Participants also felt that they were healthier, safer and had a greater economic well-being as a result of the YOE project. Statistically
significant increases in how much participants enjoyed and achieved in their school and social activities were also observed. Participants also felt they were making a significant positive contribution to their home and school life and other peoples’ lives. The findings from the SOUL questionnaire are based on a much larger dataset and therefore have important implications for the design and delivery of future projects of this type. The findings from the standardised empirical University of Essex research are limited because of the small sample size, but suggest a need for more longitudinal analysis on larger groups. However, both the self-reported and observed positive changes in participants behaviour and attitude advocate a role for nature based activities in addressing some of the escalating behavioural problems.

7.3 Conclusions on social costs saved

The YOE project is a three-year project for young people aged 11-18 years who are affected by a high level of disadvantage. These youth may be termed ‘youth at risk’ due to their increased likelihood of school failure, aggressive and anti-social behaviour, violence, unemployment, crime and mental ill health [52]. Each individual who is enrolled on the YOE project is involved for a period of 12 weeks, during which they attend weekly outdoor sessions. The cost for each participant per weekly session is estimated at £19: this covers staff costs, travel costs, food and materials and administration costs. Thus the total cost of taking part in the YOE project for 12 weeks is approximately £228 per person. For the 14 participants included in this evaluation, the total cost per session was £266, producing an aggregated cost of their participation in the YOE project at £3192.

Whilst there is a substantial cost involved in the running of the YOE project, the costs to society of not providing this service are greater. Nature based interventions such as those in the YOE project have been demonstrated to increase mental well-being such as self-esteem and mood and also facilitate behaviour change [52]. It has also been shown that natural interventions with disadvantaged youth have led to a decrease in criminal activity and antisocial behaviour, both of which can lead to pathways to imprisonment [52]. Table 1 displays the daily and yearly costs associated with some of the socially-undesirable behaviours that could be prevented with the use of nature-based interventions. The social costs saved (benefits) of the YOE project can be estimated from assumptions about possible pathways of individuals and groups.
1. If the YOE project were to prevent all 14 youths involved from dropping out of school and becoming unemployed for just one week the benefit to society would be a cost saving of £752.

2. The estimated weekly cost saving of preventing youth crime and violence in 14 youth would be £3696 and £55,685 respectively.

3. If the YOE project were to prevent 14 individuals from entering a secure children’s home, training centre or young offenders’ institution for just one week, the savings would be £32,054, £42,882 and £15,628 respectively.

4. Whilst one week of participation in the project is estimated to cost more than the costs incurred by individuals of one week of mental ill-health, mental illness is a long term problem which is likely to last for an extended period of time. Participating in a nature-based intervention like the YOE project can prevent the onset of mental ill health [52] and thus save the UK economy a substantial amount every year.

However, it should be noted that the savings calculated above are only projected values and are therefore the ‘potential’ savings associated with preventing youth from engaging in undesirable behaviours. Nature-based interventions can save the UK economy huge sums of money each year, through the reductions in mental ill health, crime, violence and imprisonment [52].
<table>
<thead>
<tr>
<th>Risk</th>
<th>No.</th>
<th>Yearly Social Cost</th>
<th>Weekly social cost per person</th>
<th>Total weekly cost for 14 participants involved in the YOE evaluation</th>
<th>Estimated Weekly Saving for 14 participants involved in the YOE evaluation</th>
</tr>
</thead>
</table>
| 1. Youth unemployment (aged 16+) | 1.24 million unemployed youth [56]                                  | Productivity loss to the economy: £3.65 billion  
Cost in job seekers allowance: £1.04 billion [56]  
Total: 4.69 billion | Productivity loss to the economy: £57  
Cost in job seekers allowance: £16  
Total: £73 | Productivity loss to the economy: £792  
Cost in job seekers allowance: £225  
Total: £1018 | Productivity loss to the economy: £526  
Cost in Job seekers allowance: £40.60  
Total: £752 |
| 2. Youth Crime (aged 10-21)   | 70,000 enter the criminal justice system each year [56]              | £1.03 billion [56]                                                                  | £283                          | £3962                                                             | £3696                                                              |
| 3. Youth Violence             | Approximately 60,630 youths commit violent crimes in a year [57]    | £12.6 billion [58]                                                                  | £3997                         | £55,951                                                           | £55,685                                                            |
| 4. Imprisonment (aged 10-21)  | Approximately 12,665 young people are in prison each year [56]. 10999 aged 18-21 years and 1,666 child prisoners. | Secure children’s home*: £200 million  
Secure training centre*: £267 million  
Young offenders institution*: £100 million  
Adult prison (aged 18+): £450 million | Secure Children’s home: £2309  
Secure Training centre: £3082  
Young Offenders institution per person: £1154  
Adult prison (aged 18+): £787 | Secure children’s home: £32,321  
Secure Training centre: £43,148  
Young offenders’ institution: £16,160  
Adult prison: £11,015 | Secure Children’s home: £32,055  
Secure Training centre: £42,882  
Young offenders institution: £15,894  
Adult Prison: £10,749 |
| 5. Mental ill health (aged 5-15years) | Approximately 607,402 young people have a mental health problem each year | £143 million [59]                                                                  | £4.5                          | £63.39                                                           | -£203                                                              |

*Note; this is the cost if all youth prisoners were to enter the specific institute.

The estimated weekly and per person costs are calculated from the yearly cost and the number of people involved in the particular risk category.
8. References

37. Russell, K.C., Theoretical basis, process and reported outcomes of wilderness therapy as an intervention and treatment for problem behaviour in adolescents. 1999, College of Graduate Studies, University of Idaho.


