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Outdoor adventure education for children in Scotland: quantifying the benefits

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Outdoor adventure education (OAE) is widely recognised for its ability to elicit personal and social development for its participants. However, quantitative evidence on which this recognition is based is frequently questioned, and is virtually absent in Scotland. To provide some of the first statistically determined evidence from Scotland that OAE benefits personal and social development, and through this understand concerns over the robustness of quantitative evidence, a survey of children 10–12 years old attending a residential week of OAE was undertaken. A small positive benefit was measured after the intervention, but this was lost 10 weeks later. The loss is attributed to euphoria at the time and limited integration of experiences into subsequent classwork. Teachers said they were reluctant to integrate outcomes when some pupils could not participate, commonly those from poorer families. Pupils who perceived themselves as having relatively poor personal and social skills appeared to gain most benefit and then lose the least. Since these pupils may well come from poorer families, funding to allow them to participate would permit integration of outcomes into classwork and benefit all pupils. The methodology highlights the need for carefully selected samples, use of an appropriate questionnaire and control of numerous variables.

Keywords: adventure; Scotland; quantitative methodologies; personal and social development

Background

Outdoor adventure education (OAE) is one of a wide range of outdoor learning experiences available for use by teachers who are implementing the outdoor learning component of the Scottish Curriculum for Excellence (LTS, 2010). OAE is an area of education that is widely recognised for its ability to elicit personal and social development (PSD), and in turn contribute to better achievement at school through the use of an exceptionally rich experiential learning environment integrating a number of natural, physical and social dimensions (Christie, 2012; Hopkins & Putnam, 1993; McKenzie, 2003). As such, it would appear to articulate well with many parts of the four 'capacities' of the Curriculum for Excellence—successful learners, confident individuals, responsible citizens and effective contributors. However, despite strong support in the Scottish parliament and amongst parents for the inclusion of OAE in the school timetable (Allardyce, 2008; BBC, 2008; TESS, 2009), outdoor centres that provide the essential facilities are closing or face closure (SOEC, 2011a; TESS, 2008). Funds cannot be found from hard-pressed education budgets for an introductory residential week of activities for all school children, or even

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for smaller, more targeted programmes. Most schools that do offer their pupils a residential week can only do so with a large fund-raising effort and/or a large parental contribution to the cost. This demand on parents excludes some less well-off families whose children might gain most from the experience.

The widely (although not universally; see Brookes, 2003) held view that OAE has the ability to elicit PSD is based on several decades of quantitative and qualitative research (Barrett & Greenaway, 1995; Neill, 2008; Rickinson et al., 2004). Very little of the published research comes from the United Kingdom; some qualitative research from Scotland has been published, but little or no quantitative research. Given the enormous potential for high-quality OAE in Scotland, this lack of empirical research is surprising. Be that as it may, results from qualitative research conducted worldwide show clear, positive benefits for PSD and are beginning to shed light on learning processes as well as outcomes (e.g., Allison & von Wald, 2010). Results from quantitative research, on the other hand, are more mixed, but still generally positive. The most widely quoted meta-analysis of quantitative measures of benefit found a small–medium mean effect size of $d = +0.34$, although individual measures ranged from –1.9 to +2.6 and about 14% of the 1728 effect sizes used were zero or negative (Hattie, Marsh, Neill, & Richards, 1997). A more recent review of several meta-analyses confirmed this picture (Neill, 2008), and mirrors results from quantitative research into the benefits of interventions in the wider education and psychology fields (Lipsey & Wilson, 1993). Although there appears to be a degree of disparity in measures of benefit made qualitatively and quantitatively (the first wholly positive; the second mixed, and negative in some cases), which is even seen within some individual studies where both research methods have been used (e.g., Christie, 2004), the belief amongst virtually all customers, practitioners (teachers and outdoor activities providers) and researchers remains that OAE is effective in benefiting PSD.

Arising in part from the mixed results from quantitative measures of benefit, there is a long-standing view amongst researchers in OAE that their measurements are not as rigorous as they should be (for a historical record of this view, see Barrett & Greenaway, 1995; Neill, 2008; Rickinson et al., 2004). Since most funders demand quantitative evidence of programme effectiveness, this perceived weakness in the empirical evidence of benefit damages claims of effectiveness and threatens the funding of OAE. In a project to provide some of the first statistically determined evidence from Scotland that OAE benefits PSD, and through this understand the long-standing concerns over the robustness of quantitative research, a survey of P6 and P7 pupils (10–12 years old) attending an introductory residential week of OAE was undertaken. It was hoped that the results would generalise to the population of P6 and P7 pupils in Scotland. In this paper, the project planning, methodology, results and implications for researchers, practitioners and policy-makers are presented. The reader is warned that although some sensible results were obtained in terms of measured benefit for PSD, some of the methodology was indeed found to be less than sound. The composition of the samples, the questionnaire design and the control of variables presented the main causes for concern over rigour.

Although the motivation for this study was to obtain quantitative evidence that might mitigate the current difficulty with funding OAE for school pupils in Scotland, the implications of the results presented here are relevant beyond Scotland, since the difficulties with securing the funds to sustain the provision of OAE exist across the whole of the United Kingdom (FSC, 2012). In addition, the issues concerning research methodology are relevant worldwide.

Project plan and methodology

In planning this project and choosing the methodology, particular attention was paid to three areas where reviews of quantitative methodology have repeatedly questioned experimental rigour (Barrett & Greenaway, 1995; Neill, 2008). These areas are the composition of the sample, the appropriateness of the questionnaire and potentially uncontrolled variables.

The project adopted a commonly used quantitative research methodology in order to obtain a measurement of PSD benefit from residential OAE. This involved administering a self-report questionnaire to pupils before and after they undertook a one-week residential experience. The questionnaire was also administered two to three months later in order to add a longitudinal element to the project. Pupils' scores on the questionnaire were used to discover whether there was any departure from the null hypothesis that there would be no change in the pupils' perception of their personal and social skills as a result of the intervention. Of course, it was hoped that there would be a change for the better to indicate some benefit for the pupils' PSD. It was likely that this change would be of effect size $d = +0.2$ to $+0.3$, given the results of meta-analyses referred to above. Using this effect size together with a desirable statistical power of 0.8 and a significance criterion, $\alpha = 0.05$ for any departure from the null hypothesis, it was possible to determine the desirable sample size to detect a statistically significant benefit of about 0.2. Tables in Cohen (1988) indicated that the sample size should be about 250 for the experimental group. It was planned to recruit a control group of approximately the same size.

Turning now to the questionnaire to measure PSD, because the research field of OAE is relatively immature, certainly in comparison with education in general and psychology, and because it addresses such a multidimensional subject with numerous potential variables impacting on outcomes, it was difficult to find an established, published questionnaire that would be entirely appropriate to this particular project. One that would be suited to children 10–12 years old could not be found. On the other hand, there are well-established principles that can be followed to design a tailor-made questionnaire from scratch. Sibthorp (2000) discussed general principles applying to OAE, and further details could be obtained elsewhere, such as Borgers et al. (2004) on measurement scales for children. Thus, a tailor-made questionnaire was designed, validated and tested for this project. This was achieved with some apprehension, however, because children's understanding of the world is developing at rapid but disparate rates amongst 10–12 year olds, which could affect the validity and reliability of the questionnaire (Greig, Taylor, & McKay, 2007). The concepts on which questions were based were taken from the school curriculum on PSD, health and welfare (LTS, 2010; SOED, 1993). In contrast to most established questionnaires, in which individual items within factors ask essentially the same question apart from some reordering and re-emphasis of words (e.g. all three questions in the factor 'Achievement Motivation' in LEQ-H [Neill, 2007] ask the respondent if they 'do their best'), and therefore are bound to show good reliability, the questions derived from the school curriculum covered a wider range of personal traits and situations within the scope of each potential factor. Attempting to test for a more varied set of traits would present a challenge to the reliability of the tailor-made questionnaire, but it was considered a worthwhile experiment to discover whether a questionnaire allied to the school curriculum yielded good-quality results. The questionnaire used after validity and reliability testing is presented in Appendix 1.

With regard to variables, the dependent variables were to be the mean scores recorded for each factor by the experimental and control groups in the questionnaire in the various

tests, and the independent variables that would influence these scores were to be the impact of the intervention on the experimental group and participant gender. Constants were assumed to be the stage of development of all pupils (late primary), mode of delivery of the survey in the schools and curriculum context. For the experimental group, which comprised pupils attending three different outdoor centres, it was also assumed that the residential setting and the duration, type and delivery of the residential courses at the three different centres were the same. One of the most commonly discussed potentially confounding variables is the impact on the experimental group of euphoria or anxiety surrounding their visit to the outdoor centre. The impact of these emotions on pupils' scores on the questionnaire might obscure the true effect of the residential experience (Ewert & Sibthorp, 2009). To reduce or eliminate this effect it is recommended that the administration of the questionnaire is removed by some period of time from the visit, both before and afterwards. Commonly chosen periods of time are from one week to one month. For this project a period of one week was chosen, with a third test to be carried out about 10 weeks after the intervention.

A number of primary schools in Edinburgh and neighbouring areas that regularly take their P6 or P7 classes to an outdoor centre for an introductory week of outdoor adventure were approached to help with the project. The response was excellent. Data collection was scheduled over two years in a number of discrete phases. Early in Year 1 (2008/09 school year), pupils ($N = 65$) and teachers ($N = 5$) from five of the schools helped with validation and the final choice of questions and wording in the new questionnaire, including the design of the Likert scale. This group of pupils also helped with a pilot study of reliability and factor analysis in connection with their residential week later in Year 1. The questionnaire testing was carried out according to the general principles in Loewenthal (2001). In Year 2 (2009/10 school year), the same group of five schools provided a sample of 115 pupils to act as a control group not undertaking a residential experience, while a sample of 360 pupils from nine more schools acted as the experimental group. Although the control group of 115 did not have the theoretically determined sample size of 250, the larger-than-planned sample size (360 pupils) of the experimental group compensated for this in the statistical analysis.

Data collection took place in the schools with the support of the class teacher, although the author introduced and conducted the surveys. For the experimental group this took place in the week before their residential visit to the outdoor centre, the week after their visit and, finally, 10 weeks later. Returns were matched up by asking the pupils to write their gender and initials on the questionnaire. It was also intended to conduct some of the data analysis by gender, treating this as an independent variable for some parts of the study. The outdoor centres that helped with the project were Benmore, Lagganlia and Dounans, each of which delivered a similar programme of a mix of adventure activities across eight half-day sessions (four nights in residence). For the control group, data collection took place twice, two to three weeks apart, to simulate the timing for the experimental group, but there was no longitudinal component to this set of data. At each administration of the questionnaire the order of the questions was changed in order to reduce questionnaire familiarity, although the teachers were clear that familiarity was unlikely to be a problem at the P6/P7 stage.

Data inspection and analysis were carried out in Excel and SPSS software, in part guided by Field (2009). A wide-ranging inspection of the data was considered a very important part of data processing and reduction in order to reveal data distributions by item and case, possible relationships between one survey and another and one group and another, and the existence of unexpected variables. This approach was also of help in

determining statistical methodology. This phase of quantitative research is certainly under-reported in the literature, and possibly under-used.

Results

The questionnaire

An initial set of 52 items on various aspects of PSD was reduced to 30 items grouped into five factors on the basis of the development work carried out with the initial group of five schools. A few reverse-meaning questions were removed following the pilot study when it was clear that some pupils found them difficult to understand. On the basis of previous research with children (Borgers et al., 2004), a short, four-point Likert scale using simple response statements was used. There was a tendency towards negative skewness in the datasets. There also seemed to be some gender bias in the scoring on questions, as teachers had suggested there would be, in that girls gave more socially acceptable scores (higher) with less scatter (less self-critical). Although the validity of the questionnaire was felt to be good, both the reliability and the factor analysis were only poor to fair, most probably because of the wider-ranging nature of the questions.

Tests for internal reliability conducted during the pilot study, measurements with the control group and measurements with the experimental group yielded median Spearman's rho values ranging from as little as 0.13 to as high as 0.72 (c.f. ≥0.6 suggested by Garson [2009] for adequate reliability). Cronbach's alpha ranged from 0.41 to 0.92. These values improved markedly from pilot test to measurements with the control group and then showed little further improvement in measurements with the experimental group. An interesting feature of the results was a small but consistent improvement in reliability from the first (pre-intervention) test to the second (post-intervention) test in the three sets of tests. This could not have been an effect of the intervention, because it occurred in the control group as well as the experimental group. In discussion with the pupils' teachers it was thought that the pupils could have improved or refreshed their understanding of the concepts addressed in the questionnaire from pre-test to post-test, which were, after all, based on what they were learning about PSD in class. An external reliability test was carried out between the pre-test and post-test scores with the control group (test–retest reliability) in which the Spearman–Brown and Guttman coefficients were 0.87 and 0.86 respectively. Median Spearman's rho values were about 0.5 and Cronbach's alpha was 0.78.

At the same time as reliability tests were being carried out, confirmatory factor analyses were also conducted. Five factors (or components) had already been identified in designing the questionnaire to measure children's perception of their personal (two factors) and social (two factors) skills and their awareness of the natural environment (one factor) (Appendix 1). None of these factors performed well in the initial factor analyses. However, as with the reliability tests, factors were better defined once reverse-meaning questions were removed following the pilot study and they were also better defined in the post-tests than in the pre-tests. Moreover, the best confirmation of the factors came in the work with the experimental group, where items loaded on a single factor after principal component analysis and Varimax rotation with a median Spearman's rho value of 0.65 on average. In the description of the project above it was noted that the experimental and control groups came from different schools, which was unavoidable given the timescale of the project. Here and elsewhere in the data analysis there is evidence that suggests school background influenced the pupils' responses to the questionnaire, with the control group

delivering slightly lower scores with greater scatter, poorer measures of reliability and poorer factor confirmation. It might be of relevance to this that the control group came from schools with a lower socio-economic catchment area. This introduced a confounding variable into comparisons between experimental and control group scores that was not foreseen at the project planning stage.

It would have been best to continue to develop the questionnaire before using it for data collection, but time constraints on the project prevented this.

Measures of benefit

All statistical analysis was carried out using non-parametric methods because data distributions from all administrations of the questionnaire were negatively skewed to varying amounts. To test for statistically significant differences between samples, the Wilcoxon signed-rank test was used for related samples and the Wilcoxon rank-sum test for independent samples. Despite the non-normal data distributions, the measures reported below are mean scores, calculated on the basis that the Likert scale was interpreted by pupils in a linear way (median scores, which might more correctly be used for a skewed data distribution, are 1–2% higher than means in all cases). There also appeared to be a ceiling effect that capped the extent to which high-scoring pupils could score higher in second and later tests. However, an extensive examination of the actual impact of the ceiling effect showed that only 2% of pupils reached the capping limit on their mean scores.

The most basic measure of any benefit in PSD from the residential week of outdoor adventure activities is seen in the combined scores for the four factors on personal and social skills (Figure 1). For the experimental group, between the pre-test and the post-test a small–medium but statistically significant benefit was measured (effect size, $r = +0.2$, as measured by Pearson's correlation coefficient; Cohen's $d = +0.41$). Girls consistently scored higher than boys by 3–4%, but there was no gender difference in the amount of benefit gained. The factor addressing self-assessment of confidence consistently scored lowest of the four factors by about 8%. The same combined results for the control group showed no statistically significant benefit over a two-week period, with mixed trends for girls and boys (Figure 1).

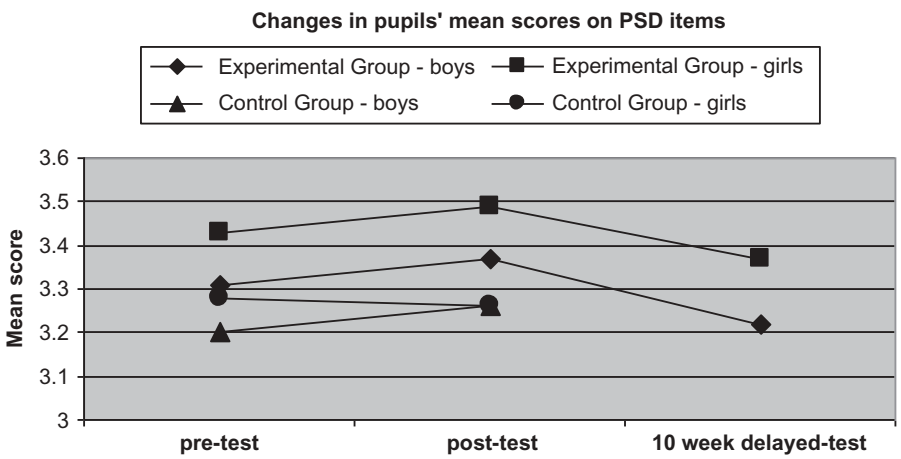

Figure 1. Changes in pupils' mean scores on PSD items across the pre-test, the post-test and the delayed test.

However, for the experimental group there was a statistically significant loss of benefit of medium effect size (r = –0.4; d = –0.87) 10 weeks later, when pupils' perception of their personal and social skills dropped to a level closer to that of the control group scores (Figure 1). This pattern of change for the experimental group across the three tests is seen in all of the factors contributing to the mean score for pupils' self-assessment of their personal and social skills. It is not an unusual pattern to emerge from such studies and has been attributed to two possible causes: anticipation and/or euphoria effects around the time of the residential visit, raising the score at that time (Marsh, Richards, & Barnes, 1986); and/or failure to capitalise upon the initial benefit because teachers do not integrate the residential experience into subsequent classroom work (e.g., Moore, 1990). The lower scores from the control group, like the poorer results from reliability tests and factor analyses with the control group, might arise from the different (lower) socio-economic background for this group, identified above as another potential confounding variable.

The scores given by pupils in response to the questions on the factor Awareness of the Natural Environment showed the same pattern across the tests. The intention in collecting these data was to investigate whether a raised awareness of the outdoor environment correlated positively with greater benefit. Further analysis to this end showed that there was no dependency of benefit on awareness of the outdoors, which is in keeping with many other investigations into this relationship (e.g., Nicol, Higgins, Ross, & Mannion, 2007; Rickinson et al., 2004).

A further objective of this project was to discover whether the extent to which pupils benefited in PSD from before to after the intervention correlated in any way with their perception of their personal and social skills before the intervention. To investigate this, the pupils of the experimental group were divided into 10 subsets of equal size based on their pre-test mean score on the questions in the four PSD factors. For the 10 subsets, their mean pre-test scores and their mean benefits were correlated assuming a simple linear relationship. The result is shown in Figure 2a.

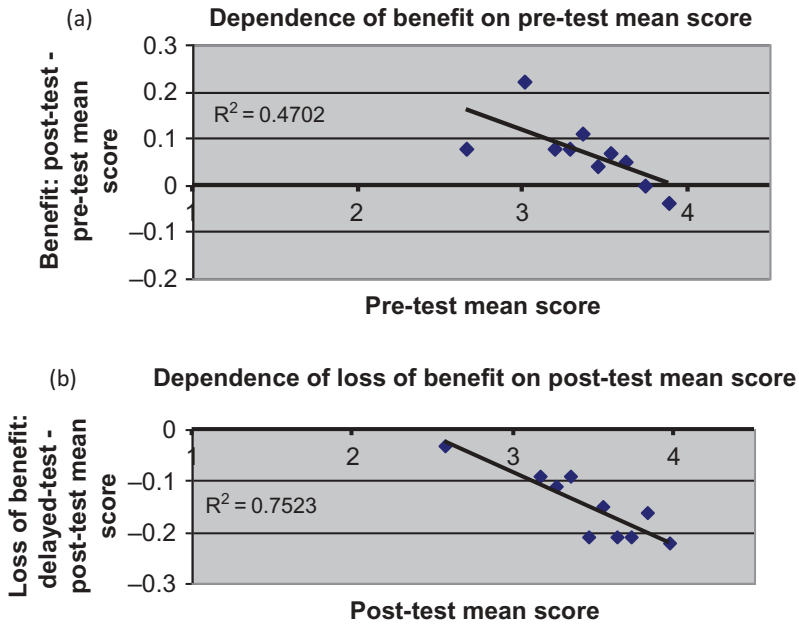

Figure 2. (a) Dependence of pupils' PSD benefit on their pre-test mean score. (b) Dependence of pupils' loss of benefit on their post-test mean score.

Although the quality of this analysis is affected by the small sample size, and there will be some influence from the ceiling effect, it is certainly interesting to note that pupils who have a low perception of their personal and social skills appear to benefit more than pupils who have a high perception, by about 5% of the Likert scale. When this analysis was extended to the loss of benefit in the delayed test and how this might correlate with pupils' perception of their skills in the post-test (Figure 2b), low-scoring pupils retained the benefit they gained from the intervention whereas high-scoring pupils lost it. Since pre-test and post-test mean scores correlate strongly, albeit with post-test scores at slightly higher values, the graph of loss of benefit against pre-test mean score is almost identical.

Interpretation

Measures of benefit

The effect size of the benefit in personal and social skills the pupils perceived immediately following the intervention is typical of many quantitative measures from residential outdoor adventure experiences: $d \approx +0.41$ compared with the mean of $d = +0.34$ in the meta-analysis of Hattie et al. (1997). To the author's knowledge, this is the first fully quantitative measure in Scotland to yield a clear positive benefit. It tends to agree with the abundant qualitative and semi-quantitative evidence of positive benefit (e.g., Allison & Von Wald, 2010; SOEC, 2011b). On the face of it, this is good evidence in support of the belief across all political parties in the Scottish parliament that all school children should have the opportunity to attend a residential outdoor adventure course (Allardyce, 2008; BBC, 2008; TESS, 2009). Moreover, there is evidence in the data that pupils who benefited the most, and retained that benefit, perceived themselves at the outset as having relatively poor social skills. Taken together with research showing that children who have relatively poor social skills come from less well-off families (Blanden & McNally, 2005), it is these children who, for financial reasons, are less likely to be able to take up a residential place should the opportunity arise. This strengthens the argument that not only should opportunities be created by policy-makers and practitioners but they should be funded, at least in a means-tested way.

The consistently higher scores of the experimental group over the control group might be used to reinforce the point just made. One interpretation of the difference in scores is that the experimental group experienced a euphoria effect associated with the residential visit (Marsh et al., 1986), but an alternative interpretation can be based on the fact that the two groups came from different groups of schools. Research into this showed that the control group came from schools in lower socio-economic catchment areas, which would be consistent with the findings of Blanden and McNally (2005) that children from less well-off families tend to have relatively poor social skills.

The strongest signal in the PSD data is the loss of $d = -0.87$ in the experimental group's perceived benefit 10 weeks after the intervention. This is a relatively large fall in comparison with other published post-intervention losses of benefit. In the meta-analysis by Hattie et al. (1997) previously cited, delayed test scores from studies with school pupils showed loss of PSD benefit in four out of the 15 studies in the analysis, but the largest of these showed a mean effect size of only $d = -0.29$ and on average over the 15 studies benefit was retained with a mean effect size of $d = +0.02$. Hattie et al. did not say whether the losses of benefit relate to any particular feature of the intervention, but there is a widely held belief that to retain benefit of any kind, affective or cognitive, gained from an

outdoor education intervention, the outcomes should be properly integrated into post-intervention coursework (Rickinson et al., 2004). We can infer from these comparisons that the relatively large loss of benefit recorded here arises from more than one cause, including a lack of integration into class follow-up work, but also other possible contributors, such as the dissipation of a euphoria effect around the time of the residential experience. Several class teachers engaged in the project said they were reluctant to integrate the outcomes of the residential experience into classwork when some of their pupils had been unable to participate for financial and other reasons. An obvious consequence of this reluctance amongst teachers is that an opportunity is lost to maximise the benefits of the experience for those who did participate. This research raises the possibility that pupils who are unable to participate for financial reasons are also likely to have relatively poor social skills and, thus, benefit most from the residential experience. It follows that if funding can be found to allow all pupils to participate, teachers could confidently integrate the experience into the curriculum and maximise the benefits for all pupils.

Methodological issues

Apart from the interpretation of the measurements taken at their face value, this project has highlighted key areas of quantitative methodology over which great care should be exercised in conducting the commonly used pre-test/post-test type of experiment. There is little doubt that despite some interesting and apparently internally consistent results, the quality of this project has been compromised by some methodological shortcomings.

The experimental and control samples of school pupils were not ideal in that the tight project schedule required them to be taken from two different groups of schools with, it transpired, different socio-economic catchment areas. Some of the results from this project can be interpreted in terms of there being a socio-economic variable. Ideally, this would not have been the case, and both samples should have comprised a random selection of upper-primary school pupils. However, it has informed the interesting suggestion made above that if pupils from poorer catchment areas are given funding to attend the outdoor adventure week, the benefit from the week could be maximised by teachers for all pupils.

Also less than ideal was the reliability of the questionnaire used. This relates to a dilemma for quantitative researchers as to whether an established questionnaire, well researched and tested but perhaps not fully appropriate for the subject of the research, is made use of, or a new questionnaire is developed that is tailored to the research. The new questionnaire developed here was tailored for use with school pupils 10–12 years old attending a residential outdoor adventure course with an understanding of the concepts of PSD from curriculum work. It also attempted to use a wider range of concepts within each intended factor. Test results clearly show that the new questionnaire could have been developed further to improve its reliability. Having said that, the distribution of scores on the questionnaire was very consistent from application to application; that is, low-scoring pupils were always relatively low-scoring pupils and high-scoring pupils were always relatively high-scoring pupils, and the rank order of mean scores on items was much the same in all applications. The external reliability test using the control group yielded acceptable results, with coefficients approaching 0.9. However, an interesting feature of the questionnaire's internal reliability was its improvement from pre-tests to post-tests for both experimental and control groups. Given that pupils consistently produced relatively low or relatively high mean scores, they must have shifted some of their scores on individual items upwards and some downwards from pre-test to post-test, in order to

improve the questionnaire reliability. From this we can infer that the pupils had a better understanding of the questionnaire on the second and third administrations, either because what they learnt during the residential week helped understanding or because the residential week acted to revise what they had learnt in class about personal and social skills.

After the sample and the questionnaire, the third broad area in which methodological shortcomings have arisen is that of constraining the many variables which exist in OAE and of identifying confounding variables. The multidimensional nature of this experiential learning environment and the way the multiple dimensions interact are illustrated in McKenzie's (2003) model of student learning on Outward Bound courses. Each dimension has its associated variables. Rickinson et al. (2004), in their review of research on outdoor learning, identified 14 'factors' that might influence student learning. Sibthorp (2003), in an empirical look at the Walsh and Golins adventure education process model, discussed 11 variables plus the multidimensional measure of self-efficacy. When planning this study the dependent variables were to be the mean scores recorded for the five factors in the questionnaire in the various tests; the independent variables that would influence these scores were to be the impact of the intervention on the experimental group and participant gender; and constants were assumed to be stage of development of the pupils (late primary), setting, duration, type and delivery of the residential courses at the three different outdoor centres used, delivery of the survey in the schools and curriculum context. Each of the independent variables and assumed constants will have introduced some scatter into the scores, potentially reducing the effect sizes calculated. However, further variables emerged during the study, the most obvious of these being a possible euphoria effect in the experimental group reflected in the difference in the pre-test scores of the experimental and control groups and possibly carried through into the post-test scores as well. This was confounded by a possible socio-economic effect in the responses of the experimental and control groups, so that the impacts of the euphoria and socio-economic effects could not be isolated from any other difference that might have existed between the experimental and control groups, and could only be speculated upon. Measures could have been taken to better constrain these possible effects had they been foreseen. More difficult to constrain, but also a confounding effect, was the possible contribution of higher, socially desirable scoring from girls.

Summary

OAE, especially when delivered in the form of a residential course in an inspiring natural environment, has the ability to contribute to the PSD of the participants. In Scotland there is strong cross-party support in the Scottish parliament and amongst parents for the inclusion of OAE in the school timetable (Allardyce, 2008; BBC, 2008; TESS, 2009). Despite this, outdoor centres that provide the essential facilities are closing or face closure (SOEC, 2011a; TESS 2008) because funds cannot be found from hard-pressed education budgets for an introductory residential week of activities for all school children. Amongst outdoor education researchers there are perceived methodological weaknesses in the quantitative evidence of benefit that damage claims of course effectiveness and dilute the argument for funding. This project was designed to provide the first statistically robust evidence from Scotland that OAE does indeed benefit PSD, and through this to try to understand the concerns over the robustness of quantitative research. To this end, survey work was carried out with P6 and P7 pupils attending an introductory week of OAE at residential outdoor centres.

Using a questionnaire tailored to the specific needs of the research, the survey measured a statistically significant benefit in the PSD of the experimental group (N = 360) from before to after the residential experience of small effect size ($d \approx +0.41$). Girls consistently scored higher than boys, but there was no gender difference in the benefit gained from the course. A control group ($N = 115$) scored lower and showed no significant improvement in PSD over an equivalent two-week period. However, in the experimental group there was a statistically significant loss of benefit of medium effect size ($d \approx -0.87$) measured 10 weeks later, when pupils' perception of their personal and social skills dropped to a level more consistent with control group scores. Further analysis of participants' scores suggested that pupils who perceived themselves as having relatively poor personal and social skills benefited more and retained this benefit, whereas pupils who perceived themselves as having good personal and social skills benefited less and then lost this benefit.

The marked loss of perceived benefit 10 weeks after the intervention could be attributed to the experience not being reinforced by integration into the school curriculum, and, perhaps, the dissipation of a euphoria effect. Teachers engaged in the project said they were reluctant to integrate the experience into the curriculum when some pupils were unable to participate in the visit to an outdoor centre for financial or other reasons. A consequence of this is that an opportunity was lost to maximise the benefits of the experience for those who did participate. The distinction between pupils who perceived themselves as having relatively poor social skills as opposed to those who perceived themselves as having good social skills exacerbates this problem, in that pupils who are unable to participate for financial reasons are also likely to have relatively poor social skills (Blanden & McNally, 2005) and thus would benefit most from attending a residential experience. The provision of funding for those who would otherwise not be able to attend would allow teachers to maximise the benefits for all pupils.

Despite efforts to maintain methodological rigour, the project did reveal some methodological difficulties. In trying to maintain rigour, particular attention was paid to aspects of the project design arising from working with children. These aspects mostly relate to the design of the questionnaire, which was populated with 30 questions on concepts familiar to the children measured on a simple-worded, four-point Likert scale (Appendix 1). However, the reliability of the questionnaire was compromised by using a wide range of familiar concepts. With regard to the sample, this was conveniently restricted to the age range of 10–12 years by the fact that in primary schools it is typically P6 and P7 pupils who have the opportunity to attend a residential week of outdoor adventure activities. In addition it was hoped that by simply involving those schools that were in the process of undertaking these visits at the time of the project the sample would be reasonably random. In the event, it seemed that, by chance, a socio-economic variable was operating between the groups of schools providing the experimental and control groups. Another confounding variable that may well have been instrumental in masking any innate differences between the experimental and control groups was related to the emotions that the children in the experimental group experienced around the time of the intervention. Although the questionnaire was administered in school in the week before and the week after the intervention, given the possibility of heightened emotions amongst children it might have been better to remove the surveys to two or three weeks before and after.

This study has implications for researchers, practitioners and policy-makers. For researchers, the implications arise from the methodology. It is rare to find a piece of quantitative research in the multidimensional field of OAE that completely avoids all methodological limitations, even with prior knowledge of potential limitations and the

project designed in good faith to avoid them. However, judging from criticism levelled at quantitative research in OAE, the greatest possible rigour is required to underpin claims of course effectiveness and arguments for funding, as well as contributing to a fuller understanding of why OAE is so effective in delivering PSD. This research found that project design should focus on optimising the quality of the samples in the experimental and control groups, using the most appropriate questionnaire and the researcher doing all they can to identify and control for unwanted variables.

For practitioners, it is reassuring that a positive benefit in PSD from a residential week of OAE can be measured experimentally, providing consistency with what they themselves had observed and read about from qualitative research. However, it is important to give pupils every chance to gain the maximum, long-lasting benefit from the residential experience, and this is principally by relating the residential experience to curriculum content and embedding the experience into classwork.

For policy-makers and funders, there is some evidence that pupils who benefit most from the residential experience are likely to be those whose parents can least afford to pay the contribution towards costs. If teachers are reluctant to embed the experience into classwork when some of their pupils have not been able to attend, then the absence of a few pupils is preventing teachers from maximising the benefit for those pupils who were able to attend. Providing sufficient, ring-fenced funds to allow financially less well-off pupils to attend the 'residential' will maximise the benefits for all pupils.

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References

Allardyce, J. (2008, May 25). Outdoor education mandatory for young Scots. *The Sunday Times.*

Allison, P., & Von Wald, K. (2010). Choices, values and untidy processes: Personal, social and health education on educational expeditions. In S. K. Beames (Ed.), *Understanding educational expeditions* (pp. 55–65). Rotterdam: Sense.

Barrett, J., & Greenaway, R. (1995). *Why adventure?* Coventry: Foundation for Outdoor Learning.

BBC. (2008). *Bid to boost outdoor learning*. Retrieved June 2011 from news.bbc.co.uk/1/hi/scotland/7411997.stm

Blanden, J., & McNally, S. (2005). Mind the gap: Child poverty and educational attainment. *Poverty (Journal of the Child Poverty Action Group)*, *123*(Winter), 10–13.

Borgers, N., Hox, J., & Sikkel, D. (2004). Response effects in surveys on children and adolescents: The effects of number of response options, negative wording and neutral mid-point. *Quality & Quantity*, *38*(1), 17–33.

Brookes, A. (2003). A critique of neo-Hahnian outdoor education theory. Part one: Challenges to the concept of 'character building'. *Journal of Adventure Education and Oudoor Learning*, *3*(1), 49–62.

Christie, E. (2004). *Raising achievement in secondary schools?: A study of outdoor experiential learning* (Unpublished PhD thesis). Edinburgh: Edinburgh University.

Christie, E. (2012). *The impact of outdoor learning experiences on attainment and behaviour in schools: A brief review of literature*. Report prepared for Forestry Commission Scotland. University of Edinburgh, 37 pp.

Cohen, J. (1988). *Statistical power analysis for the behavioural sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

Ewert, A., & Sibthorp, J. (2009). Creating outcomes through experiential education: The challenge of confounding variables. *Journal of Experiential Education*, *31*(3), 376–389.

Field, A. (2009). *Discovering statistics using SPSS* (3rd ed.). London: Sage.

FSC (Field Studies Council). (2012). *Save our outdoor education centres*. Retrieved May 11, 2012, from www.field-studies-council.org/news/save-our-outdoor-education-centres.aspx

Garson, G. (2009). *Reliability analysis: Statnotes from North Carolina University*. Retrieved July 28, 2011, from faculty.chass.ncsu.edu/garson/PA765/reliab.htm [Now available at www.statisticalassociates.com/]

Greig, A., Taylor, J., & McKay, T. (2007). *Doing research with children* (2nd ed.). London: Sage.

Hattie, J., Marsh, H., Neill, J., & Richards, G. (1997). Adventure education and Outward Bound: Out-of-class experiences that have a lasting effect. *Journal of Educational Research*, *67*(1), 43–87.

Hopkins, D., & Putnam, R. (1993). *Personal growth through adventure*. London: David Fulton.

Lipsey, M., & Wilson, D. (1993). The efficacy of psychological, educational and behavioural treatment: Confirmation from meta-analysis. *American Psychologist*, *48*(12), 1181–1209.

Loewenthal, K. (2001). *An introduction to psychological tests and scales*. Hove: Psychology Press.

LTS (Learning and Teaching Scotland). (2010). *Curriculum for excellence through outdoor learning*. Retrieved May 10, 2012, from www.educationscotland.gov.uk/Images/cfeoutdoorlearningfinal_tcm4-596061.pdf

Marsh, H. W., Richards, G. E., & Barnes, J. (1986). Multidimensional self-concepts: A long term follow-up of the effect of participation in an Outward Bound program. *Personality and Social Psychology Bulletin*, *12*(4), 475–492.

McKenzie, M. (2003). Beyond 'The Outward Bound Process': Rethinking student learning. *Journal of Experiential Education*, *26*(1), 8–23.

Moore, G. (1990). Adventure activities for school children. In J. C. Miles & S. Priest (Eds.), *Adventure education*. State College, PA: Venture Publishing.

Neill, J. (2007). *Life effectiveness questionnaire: A research tool for measuring personal change*. Retrieved March 31, 2011, from www.wilderdom.com/leq.html

Neill, J. (2008). *Enhancing life effectiveness: The impacts of outdoor education programs* (Unpublished PhD thesis). University of Western Sydney, Sydney.

Nicol, R., Higgins, P., Ross, H., & Mannion, G. (2007). *Outdoor education in Scotland: A summary of recent research*. Edinburgh: Scottish Natural Heritage and Learning and Teaching Scotland.

Rickinson, M., Dillon, J., Teamey, K., Morris, M., Choi, M., Sanders, D., & Benefield, P. (2004). *A review of research on outdoor learning*. Shrewsbury: National Foundation for Educational Research and King's College London.

SOEC (Scottish Outdoor Education Centres). (2011a). *Scottish outdoor education centres*, *case for support*. Retrieved May 10, 2012, from soec.org.uk/wp-content/uploads/2011/10/case-for-support-feb-11.pdf

SOEC (Scottish Outdoor Education Centres). (2011b). *SOEC meeting the needs of young Scots*. Retrieved May 10, 2012, from www.soec.org.uk/2011/10/soec-meeting-the-needs-of-young-scots/

SOED (Scottish Office Education Department). (1993). *Guidelines on Personal and Social Development 5–14*. Retrieved March 31, 2011, from www.ltscotland.org.uk/5to14/guidelines/psdevelopment.asp

Sibthorp, J. (2000). Measuring weather . . . and adventure education: Exploring the instruments of adventure education research. *Journal of Experiential Education*, *23*(2), 99–107.

Sibthorp, J. (2003). An empirical look at Walsh and Golins' adventure education model: Relationships between antecedent factors, perceptions of characteristics of an adventure education experience, and changes in self-efficacy. *Journal of Leisure Research*, *35*(1), 80–106.

TESS (Times Education Supplement Scotland). (2008). *Cutbacks target outdoor centres*. Retrieved May 10, 2012, from www.tes.co.uk/article.aspx?storycode=25891

TESS (Times Education Supplement Scotland). (2009). *A week in education*. Retrieved May 10, 2012, from www.tes.co.uk/article.aspx?storycode=6023398

Appendix 1. Questionnaire

Factor 'Awareness of the Outdoor Environment': Qs 1, 6, 11, 16, 21, 26
Factor 'Self-Perception of Competence': Qs 2, 7, 12, 17, 22, 27
Factor 'Self-Perception of Confidence': Qs 3, 8, 13, 18, 23, 28
Factor 'Awareness of Others': Qs 4, 9, 14, 19, 24, 29
Factor 'Attitude towards Groups': Qs 5, 10, 15, 20, 25, 30

Statements about you	**How do you feel about this statement?**			
1. I enjoy being outdoors	No, this is not like me	This is not really like me	This could be like me	Yes, this is definitely like me
2. I like to help with jobs around school	No, this is not like me	This is not really like me	This could be like me	Yes, this is definitely like me
3. I am a confident person	No, this is not like me	This is not really like me	This could be like me	Yes, this is definitely like me
4. I think I am good at making new friends	No, this is not like me	This is not really like me	This could be like me	Yes, this is definitely like me
5. I like team games	No, this is not like me	This is not really like me	This could be like me	Yes, this is definitely like me
6. I watch nature programmes on the TV	No, this is not like me	This is not really like me	This could be like me	Yes, this is definitely like me
7. I have hobbies that keep me busy	No, this is not like me	This is not really like me	This could be like me	Yes, this is definitely like me
8. I enjoy new experiences	No, this is not like me	This is not really like me	This could be like me	Yes, this is definitely like me
9. I am happy to help other people get their jobs done	No, this is not like me	This is not really like me	This could be like me	Yes, this is definitely like me
10. I prefer working on my own to working in a group	No, this is not like me	This is not really like me	This could be like me	Yes, this is definitely like me
11. I enjoy school classes that take us outdoors	No, this is not like me	This is not really like me	This could be like me	Yes, this is definitely like me
12. I like to be active and get on with things.	No, this is not like me	This is not really like me	This could be like me	Yes, this is definitely like me
13. I know I have the ability to finish what I set out to do	No, this is not like me	This is not really like me	This could be like me	Yes, this is definitely like me
14. I like listening to my friends when they have a story to tell	No, this is not like me	This is not really like me	This could be like me	Yes, this is definitely like me

(*Continued*)

Appendix 1. (***Continued***.)

Statements about you	**How do you feel about this statement?**			
15. I learn a lot from working in a group	No, this is not like me	This is not really like me	This could be like me	Yes, this is definitely like me
16. I prefer school classes that allow me to discover things for myself	No, this is not like me	This is not really like me	This could be like me	Yes, this is definitely like me
17. I give up when a problem becomes difficult to solve	No, this is not like me	This is not really like me	This could be like me	Yes, this is definitely like me
18. I enjoy presenting the results of my work to the class	No, this is not like me	This is not really like me	This could be like me	Yes, this is definitely like me
19. I have no time for friends apart from my school friends	No, this is not like me	This is not really like me	This could be like me	Yes, this is definitely like me
20. I am happy to be chosen as the leader of a team	No, this is not like me	This is not really like me	This could be like me	Yes, this is definitely like me
21. I believe it is important to protect the outdoor environment	No, this is not like me	This is not really like me	This could be like me	Yes, this is definitely like me
22. I feel proud about the tasks I have successfully completed	No, this is not like me	This is not really like me	This could be like me	Yes, this is definitely like me
23. I find it easy to make decisions about things	No, this is not like me	This is not really like me	This could be like me	Yes, this is definitely like me
24. I find it easy to talk with adults as well as young people	No, this is not like me	This is not really like me	This could be like me	Yes, this is definitely like me
25. I would listen carefully to all my team-mates if I was their leader	No, this is not like me	This is not really like me	This could be like me	Yes, this is definitely like me
26. I take part in activities in the countryside with my family	No, this is not like me	This is not really like me	This could be like me	Yes, this is definitely like me
27. I always try to do my best	No, this is not like me	This is not really like me	This could be like me	Yes, this is definitely like me
28. I stay calm when things go wrong	No, this is not like me	This is not really like me	This could be like me	Yes, this is definitely like me
29. I always listen carefully to instructions	No, this is not like me	This is not really like me	This could be like me	Yes, this is definitely like me
30. I find that working in a group makes it hard to reach a decision	No, this is not like me	This is not really like me	This could be like me	Yes, this is definitely like me