

**Name of paper:**

Preliminary Findings from a Meta-Analysis of Adventure Therapy Program Effects

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**Abstract:**

This study conducted a meta-analysis of studies that empirically report on participant outcomes for adventure therapy programs, and examined variation in these outcomes across different types of participants and programs. The results are based on 2,356 effect sizes, from 175 unique samples located within 166 studies. Results are reported for three treatment groups (Adventure Therapy Treatment, Alternative Treatment, and No Treatment) and, where available, are broken down across three time comparisons (Base-Pre, Pre-Post, and Post-Follow-Up). The average standardised mean effect size for the treatment group from Base-Pre was .09, Pre-Post was .47, and Post-Follow-Up was .05, which compared favourably to negligible effect sizes for the Alternative and No Treatment groups ( $< .1$ ). Additionally, moderator variables were assessed for changes in the Adventure Therapy Treatment group Pre-Post. In most instances, findings indicated no clear or notable moderator effects, providing further support for the robustness of the overall moderate effectiveness of adventure therapy, and for the use of findings from this study for benchmarking program effectiveness.

**Key words:**

meta-analysis, adventure therapy, treatment effectiveness, program evaluation

**Full text:**

This paper has been developed as part of the first author's Doctor of Clinical Psychology candidature at the University of Canberra, Australia.

### Introduction

Adventure therapy is increasingly seen as a credible treatment approach for a range of clientele (Gass, Gillis, & Russell, 2012; Pryor, 2009). Internationally, adventure therapy programs take many forms and operate in a range of settings (Berman & Davis-Berman, 2000). In some cases adventure therapy is used as the primary method of treatment, whilst other times it is utilised as an adjunct to more mainstream therapeutic interventions (Newes, 2000). Treatment outcomes that are commonly sought in adventure therapy include the development of personal responsibility, cooperation and relationship building, intrapsychic outcomes (e.g., self-awareness, self-efficacy, self-confidence), social skill acquisition, and psychological resilience (Gass et al., 2012).

Adventure therapy programs are typically designed and developed around several goals and to target specific populations (e.g., substance abusers; psychiatric inpatients; disabled children; physical, emotional and sexual abuse victims; sexual perpetrators; at-risk teens; adjudicated youth; couples and families) (Cason & Gillis, 1994). Although adventure therapy predominantly takes place in the outdoors, it is recognised that it can also effectively operate indoors (Richards, Carpenter, & Harper, 2011). Gillis and Gass (2003) indicated that adventure therapy typically occurs in three locations: a) on challenge/ropes courses and through games, trust activities and initiative experiences; b) in wilderness settings; and c) at residential camps. Features which differentiate adventure therapy from other treatment modalities include: a) the emphasis on the effect of the experience; b) the deliberate tempering of perceived risk in order to utilise elevated levels of arousal and eustress; and c) holistic effects on client learning (Crisp, O'Donnell, Kingston, Poot, & Thomas, 2000).

In the twenty-first century, adventure therapists are increasingly expected to provide accountability information and evidence of program effectiveness to boards, treatment facilities, funding bodies, policy makers and consumers. Further, in order to develop and refine effective adventure therapy programs which precisely accommodate client needs, program evaluation is essential. It is therefore necessary for rigorous research to document the effect of adventure therapy programs and to analyse the contributing factors. In order to address the problem of clarity in the overall analysis of adventure programming effectiveness, a meta-analysis is needed.

In 1992, Gillis recommended that "someone needs to conduct a meta-analysis of therapeutic aspects of adventure-challenge-outdoor-wilderness that includes the criteria of clinical significance along with traditional methods of effects size" (p. 7). To date, a number of meta-analyses have been published in the areas of education (e.g., Hattie, 1992), psychological

training (Lipsey & Wilson, 1993), psychotherapy (Casey & Berman, 1985; Smith, Glass, & Miller, 1980), and outdoor education (Gillis & Speelman, 2008; Hans, 2000; Hattie, Marsh, Neill, & Richards, 1997; Wilson & Lipsey, 2000). However, the outdoor education meta-analyses have predominantly focused on the broader field of adventure programming, with none solely focused on therapeutic programs. Although a number of unpublished adventure therapy meta-analyses exist, one remains incomplete (Stauton, 2003), one was unable to obtain a considerable number of potential studies due to cost (Baker, 2011), and one focused specifically on Outdoor Behavioral Healthcare programs for adolescents (George, 2011). See Table 1 for a summary of previous related meta-analyses.

Table 1

*Effects Sizes from Outdoor Education, Camping, Adventure and Wilderness Therapy Meta-analyses\**

Author/Year	Focus	Client Group	No. of Studies	No. of effects	No. of Participants	ES Baseline (Base-Pre)	ES Program (Pre-Post)	ES Follow-Up (Post-FU)
Baker (2011)	Adventure Therapy	All	18	67	982	-	.42	-
Bedard (2004; 2003)	Wilderness Therapy	Juvenile Delinquents	23	37	2,042	-	.45	-
Bunting & Donley (2002)	Challenge (Ropes) Course	All	15	na	na	-	.55	-
Cason (1993; 1994)	Adventure Education	Adolescents	43	147	11,238	-	.31	-
George (2011)	Outdoor Behavioural Healthcare	All	25	233	4,172	-	.45	-
Gillis & Speelman (2008)	Challenge (Ropes) Course	All	44	390	2,796	-	.43	-
Hans (2000)	Adventure Programming (Locus of Control)	All	24	30	1,632	-	.38	-
Hattie et al. (1997)	Outdoor Education	All	96	1,728	12,057	-.05**	.34***	.17****
Marsh (1999)	Camping (Self-Concept & Self-Esteem)	Children/Adolescents	22	37	1,139	-	.25	-
Stauton (2003)	Adventure Therapy	All	17	95	~1,000	-	.42	-
Wilson & Lipsey (2000)	Wilderness Therapy	Juvenile Delinquents	22	60	~3,000	-	.18	-

Note. \*Adapted from Neill (2002, 2003, 2009); \*\* Based on 316 effect sizes; \*\*\*Based on 1,062 effect sizes; \*\*\*\*Based on 347 effect sizes.

The current study, therefore, sets out to: a) locate empirically-based outcome studies about adventure therapy programs across the lifespan, b) analyse and compare outcomes of different programs, and c) link the outcomes to program characteristics.

An exploration of the relationships between program effectiveness, outcomes and characteristics should help to clarify why some programs demonstrate improvements while others report minimal or no positive outcomes. It is expected that findings in this area should encourage adventure therapists to examine the impact of their programs and provide direction for program revision.

## Method

### Selection Criteria

The following selection criteria, adapted from previous related meta-analyses (George, 2011; Wilson & Lipsey, 2000), were used to determine the relevance of possible studies for an adventure therapy meta-analysis:

1. Primarily uses wilderness, adventure or outdoor recreation activities specifically for psychological and/or behavioural therapeutic purposes
2. Reports at least pre- and post-psychological and/or behavioural outcomes

3. Provides sufficient statistical information to allow calculation of standardised mean effect sizes (e.g. means, standard deviations, number of participants)
4. Reported in 1960 or later, and in English

### Search Strategy

A systematic search for relevant adventure therapy studies was conducted between February 2012 and June 2012. Search terms included (adventure OR outdoor OR wilderness OR nature OR eco\* OR bush OR experien\* OR recreation OR challenge OR rope\* OR expedition OR school OR camp) AND (therap\* OR psychotherap\* OR treatment OR intervention OR counsel\* OR healthcare OR program OR education OR course). The following resources were used to conduct the search:

1. Electronic data bases (e.g., PsychInfo, Google Scholar, ERIC, ProQuest Dissertations & Theses A&I)
2. Related journals (e.g., Journal of Adventure Education and Outdoor Learning, Therapeutic Recreation Journal)
3. Related internet sites (e.g., <http://wilderdom.com/>; <http://leegillis.com/AT/>)
4. Review of related meta-analyses (e.g. Baker, 2011; Cason & Gillis; George, 2011; Wilson & Lipsey, 2000)
5. Listserv and emails to experts in the field
6. Scanning bibliographies and reference lists

### Data Extraction

Identified and obtained studies were included or excluded based on the selection criteria, ensuring that duplicate samples were not included. Included studies were then coded according to a Coding Manual which was modified from Lipsey & Wilson (2001) and George (2011). A copy of the Coding Manual can be downloaded from Bowen and Neill (2012).

### Data-Analysis

This study used the statistical technique of meta-analysis to study the impacts of participation in adventure therapy programmes. Meta-analysis is "a set of statistical methods for combining quantitative results from multiple studies to produce an overall summary of empirical knowledge on a given topic" (Littell, Corcoran, & Pillai, 2008, p. 1-2). The effect size, a value which reflects the magnitude of the treatment effect, is calculated for each study and the results from each study are then combined to compute a summary effect (Ellis, 2010). The effect size statistic used in this analysis is Hedges' *g* (Hedges, 1981), the difference between the means of two groups divided or standardised by the population standardised deviation  $[(M1-M2)/SD_{pooled}]$ . The pooled sample standard deviation was calculated as  $SD_{pooled} = \text{square root of } [(n1 - 1) * s1^2 + (n2 - 1) * s2^2] / (n1 + n2 - 2)$ . As the population standard deviation is often not available, sample standard deviations were used instead. Hedges' *g* was used as the effect size statistic because it considers and adjusts for studies with small sample sizes. Cohen's (1988) standards for interpreting effect sizes is: 0.20 (small), 0.50 (medium), and 0.80 (large).

This meta-analysis was performed following the methods described by Borenstein, Hedges, Higgins, and Rothstein (2009). Briefly, a) the random-effects model was used; b) where available, a single mean effect size from each sample was calculated for each treatment group (Adventure Therapy Treatment, Alternative treatment, No Treatment), outcome category (Academic, Behaviour, Clinical, Family, Morality/Spirituality, Physical, Self-Concept, and Social), overall effect and time comparison (Base-Pre; Pre-Post; Post-Follow-Up); c) a 0.5 correlation between the measurements across time was assumed; and d) additional comparisons were conducted to explore the existence of potential moderators, including publication year, type of publication, sample size, mean age, sample source, race, gender, population, issue, funding type, use of adventure, program delivery, group structure, placement type, program type, program model, daily duration and program length.

The Adventure Therapy Treatment sample included participants who completed an adventure therapy program, the Alternative Treatment sample included participants from control groups who completed an alternative therapy program, distinct from adventure therapy, and the No Treatment sample included participants from control groups who did not participate in any form of therapy. There were three time comparisons of interest. Assessments prior to the program (Base) and at the beginning of the program (Pre) provided a Base-Pre comparison which indicates effects leading up to the start of the program, such as the influence of anticipation, excitement and/or fear prior to start of the program. Comparison of assessments at the beginning of the program (Pre) and end of the program (Post) provide a Pre-Post indication of the short-term effect of the program. Finally, assessments at the end of the program (Post) and a subsequent time (Follow-Up) provide a Post-Follow-Up comparison indicative of the longer term effect of the program.

The software program Comprehensive Meta-Analysis (CMA) Version 2 (Borenstein, Hedges, Higgins, & Rothstein, (2005) was used to conduct the analysis. CMA provides information regarding the statistical significance of the mean effect size (*z* score, *p* value and confidence intervals), variance, standard error, and heterogeneity for each effect. These statistics are briefly explained.

The *z* score, converted from the mean effect size, indicates the magnitude of an effect in terms of standard deviation units (Ellis, 2010). Whether a *z* score is significant or not depends on whether it exceeds the critical *z* value. If the *z* score exceeds the critical value ( $\pm 1.96$  when  $\alpha = .05$ ), it can be concluded that the result is statistically significant at the  $p < .05$  level (Card, 2012).

The  $p$  value indicates the probability of obtaining the finding by chance, and is a measure of how much evidence there is against the null hypothesis (Leandro, 2005). The null hypothesis ( $H_0$ ) signifies the hypothesis of no change or no effect. The smaller the  $p$  value, the more evidence there is against  $H_0$ . However, the  $p$  value does not indicate the strength or magnitude of the effect (Littell et al., 2008).

Confidence intervals represent the range of values likely to include the true effect, and thus express the level of certainty associated with the mean effect size estimate (Littell et al., 2008). A wide confidence interval implies poor precision, while a narrow confidence interval implies good precision. Intervals that are very wide indicate that little is known about the effect and that further information is needed. If the interval excludes the null value of zero, then the mean effect size is considered to be statistically significant (Ellis, 2010).

Variance is a measure of dispersion, indicating the extent to which values are spread around a mean or population parameter (Littell et al., 2008).

Standard error is an estimate of the precision of the mean effect size (Card, 2012). A smaller standard error is indicative of a more precise estimate of the mean effect size and narrower confidence interval. Conversely, a larger standard error is indicative of an imprecise estimate of the mean effect size and larger confidence interval (Ellis, 2010).

Heterogeneity refers to the extent of variation in a distribution of effect sizes, which includes both true variance and random error (Borenstein et al., 2009). Heterogeneity includes differences between studies in regards to outcomes (statistical heterogeneity), populations (clinical heterogeneity), and methods (methodological differences) (Littell et al., 2008). By assessing the heterogeneity of the distribution of effect sizes, the question is being asked: Do the individual effect size estimates reflect a common population effect size? (Ellis, 2010).

Two tests of heterogeneity calculated by CMA are the  $Q$  statistic and  $I^2$ . The  $Q$  statistic signifies the amount of heterogeneity in effect sizes amongst studies used to calculate a mean effect size, and thus assesses the null hypothesis of homogeneity versus the alternate hypothesis of heterogeneity (Borenstein et al., 2009). The  $Q$  statistic is significant when the associated  $p$  value is less than the critical alpha value (.05 in the current study), in which case the null hypothesis of homogeneity can be rejected in favour of the alternate hypothesis of heterogeneity (i.e., the variability across effect sizes is greater than expected from sampling error alone) (Lipsey & Wilson, 2001). The  $Q$  statistic is sensitive to the number of studies included in the analysis, is not sensitive to the metric of the effect size index, should be interpreted cautiously if there is inadequate statistical power, and does not provide the magnitude of heterogeneity if it exists (Card, 2012).  $I^2$  is the percentage of variability among effect sizes that exists between studies relative to the total variability among effect sizes (i.e., the ratio of true heterogeneity to total variation in observed effects) (Card, 2012). It indicates how heterogeneous the effect sizes are and is not dependent on the scale used in the meta-analysis (Littell et al., 2008).  $I^2$  is expressed as a ratio with a range of 0% to 100%, with low (or zero) values suggesting little or no heterogeneity and larger values representing high heterogeneity (Borenstein et al., 2009). Huedo-Medina, Sánchez-Meca, Marín-Martínez, and Botella (2006) suggested that  $I^2 \approx 25\%$  is a small amount of heterogeneity,  $I^2 \approx 50\%$  is a medium amount of heterogeneity, and  $I^2 \approx 75\%$  is a large amount of heterogeneity. In summary, both  $Q$  and  $I^2$  will be low (or zero) if the total dispersion is low relative to the error within studies, and higher if the total dispersion is high, relative to the error within studies (Borenstein et al., 2009).

## Results

Results are based on 2,356 effect sizes from 175 unique samples located within 166 studies published between 1967 and 2012<sup>1</sup>. The calculated effect sizes pertain to three treatment groups: Adventure Therapy Treatment (1,809; 76.8%), Alternative Treatment (304; 12.9%), and No Treatment (243; 10.3%), and where available are broken down into three time comparisons: Base-Pre (55; 2.3%), Pre-Post (1,831; 77.7%), and Post-Follow-Up (470; 20.0%).

There were approximately 14,554 unique participants ( $M = 83.2$ ;  $SD = 137.0$  per study), of whom 67% were male and 33% female. The participants ranged in age between 9 and 64 years ( $M = 17.2$ ;  $SD = 7.5$ ), and the programs lasted between 1 and 534 days, with a mean of 42.1 days ( $SD = 66.8$ ), and a median of 22.0 days. The mean length of time between Base and Pre was 20.8 days ( $SD = 15.3$ ), while the mean length of time between Post and Follow-up was 184.2 days ( $SD = 287.6$ ). A summary of the sample, participant and program characteristics are presented in Tables 2, 3, and 4, respectively. Caution should be used when interpreting some of the results due to high heterogeneity.

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<sup>1</sup> The authors are still in the process of acquiring relevant studies. Once the acquisition process is concluded, a final analysis will be completed with a resultant manuscript submitted for publication.

Table 2

*Characteristics of Adventure Therapy Studies Included in the Meta-analysis\**

Characteristic	Sample N (%)		Participant N (%)	
<b>Publication Year</b>				
1960-1969	3	(1.7)	139	(1.0)
1970-1979	12	(6.9)	754	(5.2)
1980-1989	28	(16.0)	1,648	(11.3)
1990-1999	44	(25.1)	2,574	(17.7)
2000-2009	70	(40.0)	7,380	(50.7)
2010-2012	18	(10.3)	2,059	(14.1)
<b>Publication Type</b>				
Published (Article, Book, Report)	83	(47.4)	8,495	(58.4)
Non-published (Thesis or Dissertation)	92	(52.6)	6,059	(41.6)
<b>Study Sample Size</b>				
≤ 50	88	(50.3)	2,142	(14.7)
51-100	52	(29.7)	3,709	(25.5)
101-150	13	(7.4)	1,614	(11.1)
151 +	22	(12.6)	7,089	(48.7)
<b>Methodological Quality Rating Scale (MQRS)<sup>2</sup></b>				
<b>Study Design</b>				
Single Group (Pre/Post)	95	(54.3)	9,533	(65.5)
Quasi-experimental (W/Control)	65	(37.1)	4,373	(30.0)
Randomisation with Control Group	15	(8.6)	648	(4.5)
Considered Replicable	166	(94.9)	12,515	(86.0)
Baseline Data Reported	175	(100.0)	14,554	(100.0)
Quality Control	169	(96.6)	14,104	(96.9)
<b>Follow-Up Length**</b>				
< 6 Months	149	(85.1)	11,483	(78.9)
6-11 Months	11	(6.3)	876	(6.0)
≥12 Months	15	(8.6)	2,195	(15.1)
<b>Follow-Up Rate***</b>				
< 70% Completion	156	(89.1)	12,995	(89.3)
70-84% Completion	4	(2.3)	501	(3.4)
>85% Completion	15	(8.6)	1,058	(7.3)
Collaterals Interviewed	15	(8.6)	844	(5.8)
Objective Verification of Self-Report Data	28	(16.0)	1,713	(11.8)
Dropouts Discussed	163	(93.1)	13,667	(93.9)
Independent (Blind)	0	(100.0)	0	(0.0)
Appropriate Analysis	175	(100.0)	14,554	(100.0)
Multisite with Separate Research Teams	0	(100.0)	0	(0.0)

Average MQRS Score = 7.06 (SD = 1.82)<sup>3</sup>

*Note.* \* Sample N = 175; Participant N = 14,554; \*\*Follow-up length was rated as 0 if the study did not provide follow-up assessments; \*\*\*Follow-up rate was rated as 0 if follow-up was not assessed.

<sup>2</sup> See Miller and colleagues (1995; 2002) for a detailed explanation of the MQRS.

<sup>3</sup> Ratings closer to 0 indicate poor methodological quality, while ratings closer to 16 indicating stronger or better methodological quality.

Table 3

*Characteristics of Adventure Therapy Participants across Samples\**

Characteristic	Sample N (%)		Participant N (%)	
<b>Age</b>				
≤9 Years Old	4	(2.3)	178	(1.2)
10-14 Years Old (Early Adolescents)	56	(32.0)	5,127	(35.2)
15-17 Years Old (Late Adolescents)	65	(37.1)	5,693	(39.1)
18+ Years Old (Adults)	27	(15.4)	1,978	(13.6)
Mixed (e.g., Families)	7	(4.0)	680	(4.7)
Unspecified	16	(9.1)	989	(6.2)
<b>Sample Source</b>				
Asia	7	(4.0)	316	(2.2)
Australia	24	(13.7)	1,103	(7.6)
Canada	6	(3.4)	475	(3.3)
Europe	2	(1.1)	150	(1.0)
New Zealand	3	(1.7)	228	(1.6)
USA	133	(76)	12,282	(84.4)
<b>Predominant Race</b>				
> 60% Caucasian	69	(39.4)	6,452	(44.3)
> 60% Minority	22	(12.6)	1,428	(9.8)
Mixed, No Race > 60%	14	(8.0)	1,104	(7.6)
Unspecified	70	(40.0)	5,570	(38.3)
<b>Predominant Gender</b>				
< 50% Male	31	(17.7)	2,378	(16.3)
> 50% Male	119	(68.0)	10,232	(70.3)
Unspecified	25	(14.3)	1,944	(13.4)
<b>Identified Population</b>				
At-Risk	104	(59.4)	10,139	(69.7)
Clinical	42	(24.0)	2,677	(18.4)
Adjudicated	29	(16.6)	1,738	(11.9)
<b>Identified Focus</b>				
Abuse Victims (Physical, Emotional or Sexual)	4	(2.3)	216	(1.5)
Adjudicated Youth	29	(16.6)	1,738	(11.9)
Behaviour Disordered	16	(9.1)	1,108	(7.6)
Disabilities	5	(2.9)	255	(1.8)
Educationally Disengaged	18	(10.3)	1,302	(8.9)
Emotionally Disturbed	6	(3.4)	290	(2.0)
Families	6	(3.4)	708	(4.9)
Mental Health	24	(13.7)	1,084	(7.4)
Mixed	32	(18.3)	4,297	(29.5)
Physical (e.g., Brain Injury, Weight-Loss, Etc.)	12	(6.9)	1,656	(11.4)
Substance Abuse	10	(5.7)	1,126	(7.7)
Welfare	13	(7.4)	774	(5.3)

Note. \* Sample N = 175; Participant N = 14,554.

Table 4

*Characteristics of Adventure Therapy Programs across Samples\**

Characteristic	Sample N (%)		Participant N (%)	
Funding Type				
Private	133	(76.0)	12,399	(85.2)
Public	42	(24.0)	2,155	(14.8)
Use of Adventure				
Primary	116	(66.3)	10,228	(70.3)
Adjunctive	59	(33.7)	4,326	(29.7)
Program Delivery				
Continuous	113	(64.6)	10,502	(72.2)
Intermittent	62	(35.4)	4,052	(27.8)
Group Structure				
Closed group	158	(90.3)	11,629	(79.9)
Open group	17	(9.7)	2,925	(20.1)
Placement Type				
Private	146	(83.4)	12,816	(88.1)
Adjudicated	29	(16.6)	1,738	(11.9)
Expedition Program Type				
Contained Expedition	43	(24.6)	2,794	(19.2)
Continuous-Flow Expedition	3	(1.7)	246	(1.7)
Base-camp Expedition	7	(4.0)	295	(2.0)
Residential Expedition	12	(6.9)	849	(5.8)
Mixed (Combination of these Types)	32	(18.3)	5,010	(34.4)
Unspecified/ None of the Above	78	(44.6)	5,360	(36.8)
Program Model				
Base Camp	8	(4.6)	518	(3.6)
Expedition	47	(26.9)	3,161	(21.7)
Residential	7	(4.0)	600	(4.1)
Outpatient	1	(0.6)	33	(0.2)
School	0	(0.0)	0	(0.0)
Integrated Expedition	0	(0.0)	0	(0.0)
Multiple	35	(20.0)	5,003	(34.4)
Ropes Course/Challenge Course/Adventure Based	77	(44.0)	5,239	(36.0)
Daily Duration				
Residential	103	(58.9)	9,871	(67.8)
Outpatient	28	(16.0)	1,972	(13.5)
Mixed	44	(25.1)	2,711	(18.6)
Program Length				
1-2 Days	16	(9.1)	789	(5.4)
3-7 Days	24	(13.7)	1,528	(10.5)
8-14 Days	20	(11.4)	1,379	(9.5)
15-21 Days	24	(13.7)	1,618	(11.1)
22-45 Days	41	(23.4)	3,072	(21.1)
46-80 Days	27	(15.4)	2,035	(14.0)
81-150 Days	11	(6.3)	893	(6.1)
151+ Days	8	(4.6)	878	(6.0)
Unspecified	4	(2.3)	2,362	(16.2)

Note. \* Sample N = 175; Participant N = 14,554

A summary of the overall effect sizes for each treatment group by time comparison is presented in Table 5. Detailed information regarding findings for each outcome category for each treatment group by time comparison is presented in Tables 6 to 12.<sup>4</sup>

Table 5

Overall Effect Sizes for Treatment Group by Time comparison

Time	Adventure Therapy Treatment			Alternative Treatment			No Treatment		
	<i>g</i>	<i>V</i>	<i>N</i>	<i>g</i>	<i>V</i>	<i>N</i>	<i>g</i>	<i>V</i>	<i>N</i>
Base-Pre	.09	.00	55	na	na	na	na	na	na
Pre-Post	.47	.00	1424	.13	.00	213	.03	.00	194
Post-FU	.05	.00	330	-.03	.00	91	-.08	.00	49

Note. *g* = Hedges' *g*; *V* = Variance; *N* = Number of effect sizes.

Table 6

Base-Pre Adventure Therapy Treatment Effect Sizes and Summary Information Relating to Outcome Category Variables

Outcome Category	No of Samples	No. of ES	Hedges' <i>g</i> (Variance)	Standard Error	95% CI	<i>z</i> value ( <i>p</i> value)	<i>Q</i> value ( <i>p</i> value)	<i>I</i> <sup>2</sup>
Academic	3	8	.26 (.01)	.12	.02-.49	2.12 (.034)	.43 (.808)	.00
Behaviour	2	5	-.10 (.02)	.13	-.36-.15	-.78 (.436)	.00 (.961)	.00
Clinical	6	8	.20 (.01)	.12	-.03-.43	1.68 (.093)	4.13 (.531)	.00
Family Development	1	1	.20 (.02)	.15	-.09-.50	1.35 (.179)	na	na
Morality/Spirituality	na	na	na	na	na	na	na	na
Physical	1	1	.03 (.06)	.24	-.45-.51	.13 (.896)	na	na
Self-Concept	8	19	.05 (.01)	.07	-.09-.18	.70 (.483)	1.38 (.986)	.00
Social Development	5	13	.10 (.01)	.07	-.04-.25	1.40 (.162)	.49 (.974)	.00
OVERALL	9	55	.09 (.00)	.07	-.04-.22	1.36 (.174)	1.48 .993	.00

Note: ES = Effect Size; CI = Confidence Interval.

<sup>4</sup> Only summary information for outcome categories is provided. A total of 66 distinct outcomes were included in the 8 outcome categories: Academic (*N* = 4); Behavioural (*N* = 8); Clinical (*N* = 30); Family (*N* = 2); Morality/Spirituality (*N* = 1); Physical (*N* = 2); Self-Concept (*N* = 11); Social Development (*N* = 8). For the manuscript submitted for publication, the authors intend to provide summary information for all outcomes included in each outcome category.



Table 7

*Pre-Post Adventure Therapy Treatment Effect Sizes and Summary Information Relating to Outcome Category Variables*

Outcome Category	No of Samples	No. of ES	Hedges' <i>g</i> (Variance)	Standard Error	95% CI	Z-Value ( <i>p</i> -Value)	Q-Value ( <i>p</i> -Value)	<i>I</i> <sup>2</sup>
Academic	54	106	.43 (.00)	.05	.33- .52	8.80 (.000)	201.72 (.000)	73.73
Behaviour	68	180	.42 (.00)	.06	.31- .53	7.46 (.000)	497.24 (.000)	86.53
Clinical	116	486	.50 (.00)	.05	.41- .59	10.70 (.000)	1097.09 (.000)	89.52
Family Development	28	92	.37 (.00)	.08	.22- .53	4.74 (.000)	169.52 (.000)	84.07
Morality/Spirituality	4	6	.18 (.05)	.23	-.27- .63	.78 (.437)	8.24 (.041)	63.60
Physical	10	16	.38 (.02)	.12	.14- .63	3.08 (.002)	39.30 (.000)	77.10
Self-Concept	113	310	.41 (.00)	.04	.34- .48	11.71 (.000)	437.34 (.000)	74.39
Social Development	88	228	.42 (.00)	.04	.34- .51	9.78 (.000)	436.83 (.000)	80.08
OVERALL	174	1424	.47 (.00)	.03	.40- .53	13.77 (.000)	1124.35 (.000)	84.61

Note: ES = Effect Size; CI = Confidence Interval.

Table 8

*Pre-Post Alternative Treatment Effect Sizes and Summary Information Relating to Outcome Category Variables*

Outcome Category	No of Samples	No. of ES	Hedges' <i>g</i> (Variance)	Standard Error	95% CI	Z-Value ( <i>p</i> -Value)	Q-Value ( <i>p</i> -Value)	<i>I</i> <sup>2</sup>
Academic	11	13	.14 (.00)	.06	.02- .26	2.22 (.026)	12.56 (.249)	20.39
Behaviour	16	23	.13 (.00)	.06	.00- .25	1.97 (.049)	28.28 (.020)	46.96
Clinical	24	79	.14 (.00)	.07	.01- .27	2.18 (.029)	50.13 (.001)	54.12
Family Development	3	6	-.19 (.03)	.19	-.56- .17	-1.05 (.295)	5.51 (.064)	63.67
Morality/Spirituality	na	na	na	na	na	na	na	na
Physical	3	3	.03 (.02)	.13	-.22- .29	.26 (.795)	2.52 (.283)	20.70
Self-Concept	25	52	.16 (.00)	.06	.04- .27	2.60 (.009)	49.51 (.002)	51.52
Social Development	17	35	.15 (.01)	.08	-.00- .29	1.95 (.051)	36.28 (.003)	55.90
OVERALL	36	213	.13 (.00)	.04	.06- .20	3.54 (.00)	40.72 (.27)	11.58

Note: ES = Effect Size; CI = Confidence Interval.

Table 9

*Pre-Post No Treatment Effect Sizes and Summary Information Relating to Outcome Category Variables*

Outcome Category	No of Samples	No. of ES	Hedges' <i>g</i> (Variance)	Standard Error	95% CI	Z-Value ( <i>p</i> -Value)	Q-Value ( <i>p</i> -Value)	<i>I</i> <sup>2</sup>
Academic	15	28	-.01 (.00)	.05	-.11- .00	-.29 (.772)	8.44 (.865)	.00
Behaviour	11	25	-.05 (.00)	.07	-.19- .09	-.71 (.481)	16.36 (.090)	38.89
Clinical	15	30	.05 (.00)	.05	-.05- .14	.95 (.344)	13.49 (.488)	.00
Family Development	8	17	.06 (.00)	.06	-.06- .19	1.00 (.316)	1.22 (.990)	.00
Morality/Spirituality	2	3	.03 (.31)	.60	-1.06- 1.13	.06 (.956)	8.42 (.004)	88.13
Physical	na	na	na	na	na	na	na	na
Self-Concept	24	49	.01 (.00)	.04	-.09- .09	.23 (.818)	20.25 (.627)	.00
Social Development	18	41	-.02 (.00)	.04	-.10- .07	-.38 (.707)	9.10 (.937)	.00
OVERALL	33	194	.03 (.00)	.04	-.04- .09	.77 (.44)	20.48 (.942)	.00

Note: ES = Effect Size; CI = Confidence Interval.

Table 10

*Post-Follow-Up Adventure Therapy Treatment Effect Sizes and Summary Information Relating to Outcome Category Variables*

Outcome Category	No of Samples	No. of ES	Hedges' <i>g</i> (Variance)	Standard Error	95% CI	Z-Value ( <i>p</i> -Value)	Q-Value ( <i>p</i> -Value)	<i>I</i> <sup>2</sup>
Academic	15	21	.04 (.00)	.06	-.08- .15	.65 (.517)	21.30 (.094)	34.26
Behaviour	18	40	.23 (.00)	.05	.13- .33	4.64 (.000)	22.31 (.173)	23.81
Clinical	29	88	.02 (.00)	.05	-.09- .12	.31 (.754)	61.25 (.000)	54.29
Family Development	10	16	-.05 (.01)	.07	-.18- .09	-.65 (.519)	14.52 (.105)	38.03
Morality/Spirituality	1	1	.63 (.14)	.37	-.10- 1.35	1.70 (.089)	na	na
Physical	2	2	.19 (.13)	.36	-.52- .90	.52 (.600)	6.82 (.009)	85.35
Self-Concept	36	94	-.01 (.00)	.05	-.11- .08	-.28 (.778)	86.99 (.000)	59.76
Social Development	23	68	-.02 (.00)	.05	-.14- .07	-.52 (.604)	31.79 (.081)	30.80
OVERALL	49	330	.05 (.00)	.03	-.06- .12	1.51 (.130)	79.53 (.003)	39.65

Note: ES = Effect Size; CI = Confidence Interval.

Table 11

*Post-Follow-Up Alternative Treatment Effect Sizes and Summary Information Relating to Outcome Category Variables*

Outcome Category	No of Samples	No. of ES	Hedges' <i>g</i> (Variance)	Standard Error	95% CI	Z-Value ( <i>p</i> -Value)	Q-Value ( <i>p</i> -Value)	<i>I</i> <sup>2</sup>
Academic	4	4	.00 (.01)	.10	-.20-.21	.02 (.983)	4.08 (.253)	26.54
Behaviour	6	11	.17 (.01)	.10	-.01-.36	1.81 (.070)	8.12 (.150)	38.43
Clinical	9	33	-.11 (.01)	.11	-.32-.10	-1.01 (.312)	16.55 (.035)	51.67
Family Development	2	3	-.06 (.01)	.11	-.28-.16	-.53 (.599)	.30 (.584)	.00
Morality/Spirituality	na	na	na	na	na	na	na	na
Physical	2	2	-.20 (.09)	.29	-.78-.37	-.69 (.492)	4.71 (.030)	78.78
Self-Concept	11	26	-.04 (.01)	.08	-.20-.11	-.56 (.579)	15.42 (.118)	35.14
Social Development	5	12	.00 (.02)	.12	-.24-.24	.00 (1.000)	8.45 (.076)	52.69
OVERALL	15	91	-.03 (.00)	.05	-.13-.07	-.62 (.537)	10.47 (.727)	.00

Note: ES = Effect Size; CI = Confidence Interval.

Table 12

*Post-Follow-Up No Treatment Effect Sizes and Summary Information Relating to Outcome Category Variables*

Outcome Category	No of Samples	No. of ES	Hedges' <i>g</i> (Variance)	Standard Error	95% CI	Z-Value ( <i>p</i> -Value)	Q-Value ( <i>p</i> -Value)	<i>I</i> <sup>2</sup>
Academic	2	4	-.14 (.02)	.13	-.41-.12	-1.06 (.290)	.00 (.962)	.00
Behaviour	2	8	-.07 (.02)	.13	-.32-.18	-.57 (.571)	.04 (.838)	.00
Clinical	4	11	-.27 (.05)	.23	-.72-.19	-1.16 (.247)	10.20 (.017)	70.58
Family Development	1	2	.14 (.02)	.14	-.14-.42	.97 (.331)	na	na
Morality/Spirituality	na	na	na	na	na	na	na	na
Physical	na	na	na	na	na	na	na	na
Self-Concept	6	9	-.01 (.01)	.09	-.18-.16	-.10 (.918)	2.02 (.846)	.00
Social Development	3	15	-.04 (.01)	.12	-.26-.19	-.32 (.753)	.30 (.860)	.00
OVERALL	6	49	-.08 (.01)	.09	-.26-.10	-.89 (.375)	5.33 (.377)	6.23

Note: ES = Effect Size; CI = Confidence Interval.

In addition to the overall effect size and average effect sizes based on outcome category constructs, moderator variables were also assessed for the Adventure Therapy Treatment group between Pre and Post. The following results are useful to determine trends in the data on adventure therapy program outcomes. As one study only provided enough data to calculate Post-Follow-Up effect sizes, 174 samples were included in the moderator analysis. Results for sample, participant and program variables are presented in Tables 13, 14 and 15, respectively.

Table 13

*Pre-Post Moderator Analysis for Adventure Therapy Treatment: Sample Variables\**

Variable	No of Samples	No. of ES	Hedges' g (Variance)	Standard Error	95% CI	Z-Value (p-Value)	Q-Value (p-Value)	I <sup>2</sup>
Publication Year								
1960-1969	3	43	.16 (.01)	.09	-.01- .33	1.88 (.060)	.19 (.909)	.00
1970-1979	12	130	.29 (.00)	.04	.21- .37	7.32 (.000)	9.16 (.607)	.00
1980-1989	28	208	.52 (.01)	.07	.39- .65	7.70 (.000)	82.03 (.000)	67.08
1990-1999	43	321	.39 (.00)	.05	.29- .48	7.92 (.000)	103.94 (.000)	59.59
2000-2009	70	600	.51 (.00)	.06	.38- .63	7.91 (.000)	691.18 (.000)	90.02
2010-2012	18	122	.54 (.01)	.09	.37- .71	6.25 (.000)	89.37 (.000)	80.98
Publication Type								
Published	83	636	.52 (.00)	.06	.41- .63	9.28 (.000)	770.15 (.000)	89.35
Non-published	91	788	.42 (.00)	.04	.35- .46	11.70 (.000)	290.46 (.000)	69.01
Study Sample Size								
≤ 50	87	680	.50 (.00)	.06	.42- .59	11.21 (.000)	210.14 (.000)	59.08
51-100	52	415	.40 (.00)	.05	.30- .50	7.64 (.000)	263.58 (.000)	80.65
101-150	13	92	.39 (.01)	.08	.24- .55	4.92 (.000)	49.97 (.000)	75.98
151 +	22	237	.51 (.01)	.10	.31- .71	4.90 (.000)	506.99 (.000)	95.86
MQRS Rating <sup>5</sup>								
Low (1-5)	10	77	.63 (.03)	.17	.30- .95	3.74 (.000)	119.65 (.000)	92.48
Medium (6-11)	155	1279	.46 (.00)	.04	.39- .53	12.87 (.000)	950.96 (.000)	83.81
High (12-16)	9	68	.43 (.02)	.14	.16- .70	3.16 (.002)	37.38 (.000)	78.60

Note. \*Sample N = 174; Effect Size N = 1,424.

<sup>5</sup> Methodological Quality Rating Scale. As previously mentioned, ratings closer to 0 indicate poor methodological quality, while ratings closer to 16 indicating stronger or better methodological quality.

Table 14

*Pre-Post Moderator Analysis for Adventure Therapy Treatment: Participant Variables\**

Variable	No of Samples	No. of ES	Hedges' g (Variance)	Standard Error	95% CI	Z-Value (p-Value)	Q-Value (p-Value)	I <sup>2</sup>
<b>Mean Age</b>								
≤9 Years Old	4	36	.24 (.01)	.10	.04- .44	2.38 (.017)	2.08 (.555)	.00
10-14 Years Old	56	447	.38 (.00)	.04	.29- .45	9.10 (.000)	174.66 (.000)	68.51
15-17 Years Old	64	622	.49 (.00)	.05	.39- .59	9.830 (.000)	309.24 (.000)	79.63
18+ Years Old	27	184	.65 (.14)	.14	.38- .91	4.71 (.000)	316.69 (.000)	91.79
Mixed (e.g., Families)	7	34	.66 (.03)	.18	.31- 1.00	3.75 (.000)	19.02 (.004)	68.45
Unspecified	16	101	.47 (.01)	.09	.28- .65	4.98 (.000)	72.83 (.000)	79.40
<b>Sample Source</b>								
Asia	7	35	.54 (.03)	.18	.19- .88	3.05 (.002)	20.80 (.002)	71.15
Australia	24	271	.31 (.00)	.05	.23- .40	6.90 (.000)	29.26 (.172)	21.38
Canada	6	48	.38 (.03)	.17	.04- .71	2.16 (.031)	21.79 (.001)	77.05
Europe	2	13	.22 (.03)	.17	-.12- .32	1.27 (.204)	1.72 (.189)	41.96
New Zealand	3	9	.55 (.03)	.16	.23- .86	3.42 (.001)	2.84 (.242)	29.46
USA	132	1,048	.49 (.00)	.04	.41- .57	12.16 (.000)	991.12 (.000)	86.78
<b>Predominant Race</b>								
> 60% Caucasian	69	640	.43 (.00)	.04	.35- .50	10.91 (.000)	225.87 (.000)	69.90
> 60% Minority	22	123	.37 (.01)	.08	.23- .52	4.96 (.000)	74.57 (.000)	71.84
Mixed, No Race > 60%	14	69	.41 (.01)	.07	.27- .54	5.69 (.000)	42.13 (.000)	69.15
Unspecified	69	592	.57 (.01)	.07	.43- .70	8.18 (.000)	641.30 (.000)	89.40
<b>Predominant Gender</b>								
< 50% Male	30	249	.56 (.02)	.13	.31- .81	4.35 (.000)	429.23 (.000)	93.24
> 50% Male	119	1026	.43 (.00)	.03	.37- .49	14.11 (.000)	386.38 (.000)	69.46
Unspecified	25	149	.54 (.01)	.09	.37- .72	5.99 (.000)	181.91 (.000)	86.81

Note. \*Sample N = 174; Effect Size N = 1,424.

Table 14 Continued

Variable	No of Samples	No. of ES	Hedges' <i>g</i> (Variance)	Standard Error	95% CI	Z-Value ( <i>p</i> -Value)	Q-Value ( <i>p</i> -Value)	<i>I</i> <sup>2</sup>
Identified Population								
At-Risk	103	762	.48 (.00)	.05	.39- .58	9.93 (.000)	793.49 (.000)	87.15
Clinical	42	374	.49 (.00)	.06	.38- .60	8.71 (.000)	150.29 (.000)	72.72
Adjudicated	29	288	.39 (.01)	.08	.24- .54	5.16 (.000)	176.07 (.000)	84.10
Identified Focus								
Abuse Victims	4	18	.86 (.05)	.22	.44- 1.29	4.02 (.000)	9.29 (.026)	67.71
Adjudicated Youth	29	268	.39 (.01)	.08	.24- .54	5.16 (.000)	176.07 (.000)	84.10
Behaviour Disordered	16	146	.25 (.00)	.04	.17- .33	6.17 (.000)	13.09 (.595)	.00
Disabilities	5	15	.54 (.03)	.19	.18- .91	2.92 (.004)	14.12 (.007)	71.68
Educationally Disengaged	18	119	.31 (.00)	.05	.21- .42	5.76 (.000)	29.25 (.032)	41.88
Emotionally Disturbed	6	71	.54 (.05)	.22	.11- .98	2.46 (.014)	32.86 (.000)	84.78
Families	6	35	.75 (.02)	.16	.44- 1.05	4.77 (.000)	12.39 (.030)	59.66
Mental Health	24	208	.51 (.01)	.08	.35- .68	6.27 (.000)	69.76 (.000)	67.03
Mixed	31	292	.51 (.01)	.07	.37- .65	7.20 (.000)	162.34 (.000)	81.52
Physical	12	46	.63 (.05)	.23	.19- 1.08	2.81 (.005)	245.57 (.000)	95.52
Substance Abuse	10	111	.52 (.00)	.05	.42- .63	9.81 (.000)	8.00 (.534)	.00
Welfare	13	75	.28 (.00)	.06	.17- .39	4.94 (.000)	15.39 (.221)	22.02

Table 15

*Pre-Post Moderator Analysis for Adventure Therapy Treatment: Program Variables\**

Variable	No of Samples	No. of ES	Hedges' <i>g</i> (Variance)	Standard Error	95% CI	Z-Value ( <i>p</i> -Value)	Q-Value ( <i>p</i> -Value)	<i>I</i> <sup>2</sup>
Funding Type								
Private	132	1093	.47 (.00)	.04	.39-.55	11.88 (.000)	904.23 (.000)	85.51
Public	42	331	.47 (.01)	.07	.33-.60	6.88 (.000)	218.30 (.000)	81.22
Use of Adventure								
Primary	115	1000	.42 (.00)	.03	.36-.49	12.67 (.000)	470.10 (.000)	75.75
Adjunctive	59	424	.56 (.01)	.07	.42-.71	7.61 (.000)	551.59 (.000)	89.49
Program Delivery								
Continuous	113	981	.48 (.00)	.04	.41-.55	13.73 (.000)	521.79 (.000)	78.54
Intermittent	61	443	.44 (.01)	.08	.30-.59	5.89 (.000)	586.98 (.000)	89.78
Group Structure								
Closed group	157	1295	.44 (.00)	.03	.38-.49	16.05 (.000)	467.70 (.000)	66.65
Open group	17	129	.57 (.02)	.14	.30-.84	4.14 (.000)	437.61 (.000)	96.34
Placement Type								
Private	145	1136	.49 (.00)	.04	.41-.56	12.72 (.000)	947.22 (.000)	84.80
Adjudicated	29	288	.39 (.01)	.08	.24-.54	5.16 (.000)	176.07 (.000)	84.10
Expedition Program Type								
Contained Expedition	43	460	.37 (.00)	.03	.30-.43	10.66 (.434)	64.68 (.014)	35.06
Continuous-Flow	3	15	.79 (.17)	.41	-.02-1.59	1.92 (.054)	20.66 (.000)	90.32
Base-camp	7	41	.70 (.05)	.22	.26-1.14	3.11 (.002)	30.85 (.000)	80.55
Residential	12	107	.41 (.01)	.08	.26-.57	5.29 (.000)	23.45 (.015)	53.10
Mixed (Combination)	32	340	.48 (.01)	.08	.33-.64	6.05 (.000)	240.23 (.000)	87.10
Unspecified/ None of the Above	77	461	.50 (.00)	.06	.38-.62	8.24 (.000)	686.99 (.000)	88.94

Note. \*Sample N = 174; Effect Size N = 1,424.

Table 15 Continued

Variable	No of Samples	No. of ES	Hedges' g (Variance)	Standard Error	95% CI	Z-Value (p-Value)	Q-Value (p-Value)	I <sup>2</sup>
Program Model								
Base Camp	8	43	.69 (.03)	.17	.35- 1.03	3.99 (.000)	40.94 (.000)	82.90
Expedition	47	476	.37 (.00)	.04	.30- .44	10.05 (.000)	89.98 (.000)	48.88
Residential	7	66	.35 (.01)	.09	.17- .53	3.87 (.000)	14.45 (.025)	58.47
Outpatient	1	12	1.45 (.25)	.50	.48- 2.43	2.91 (.004)	na	na
School	na	na	na	na	na	na	na	na
Integrated Expedition	na	na	na	na	na	na	na	na
Multiple	35	367	.47 (.01)	.08	.32- .63	6.05 (.000)	241.49 (.000)	85.92
Ropes-/Challenge-/ Adventure- Based	76	460	.51 (.00)	.06	.39- .63	8.28 (.000)	674.02 (.000)	88.87
Daily Duration								
Residential	103	919	.48 (.00)	.04	.41- .55	13.27 (.000)	473.09 (.000)	78.44
Outpatient	43	240	.51 (.01)	.10	.31- .71	5.00 (.000)	462.47 (.000)	90.92
Mixed	28	265	.34 (.00)	.05	.24- .45	6.32 (.000)	68.12 (.000)	60.37
Program Length								
1-2 Days	16	116	.45 (.01)	.10	.25- .64	4.50 (.000)	55.63 (.000)	73.03
3-7 Days	24	135	.58 (.01)	.09	.41- .75	6.72 (.000)	91.48 (.000)	74.86
8-14 Days	20	129	.44 (.01)	.08	.28- .60	5.24 (.000)	72.28 (.000)	73.71
15-21 Days	24	251	.32 (.00)	.03	.26- .39	9.42 (.000)	24.48 (.378)	6.03
22-45 Days	41	390	.37 (.00)	.04	.29- .45	9.10 (.000)	73.83 (.001)	45.82
46-80 Days	26	243	.42 (.01)	.07	.29- .56	6.16 (.000)	71.21 (.000)	64.89
81-150 Days	11	39	.56 (.03)	.18	.20- .92	3.04 (.002)	150.23 (.000)	93.34
151+ Days	8	86	.69 (.02)	.12	.45- .93	5.61 (.000)	27.34 (.000)	74.39
Unspecified	4	35	.93 (.13)	.36	.24- 1.63	2.63 (.009)	209.55 (.000)	98.57

Despite high heterogeneity, in most instances, findings indicated no clear or notable moderator effects. This would suggest that, on the whole, sample, participant and program variables do not greatly moderate the effectiveness of adventure therapy programs.



## Discussion

This study aimed to determine the measured effectiveness of adventure therapy as a therapeutic modality, and examine variation in outcomes across different types of participants and programs. Findings pertain to three treatment groups (Treatment, Alternative Treatment, No Treatment) and, where available, three time comparisons were made (Base-Pre, Pre-Post, and Post-Follow-Up). Caution should be used when interpreting some of the results due to high heterogeneity.

### Outcomes

The Base-Pre time comparison provided an indication of the effect leading up to the start of the program, whereby cognitions and emotions such as anticipation, excitement and/or fear may influence self-perceptions at the start of the program. Base-Pre data was only available for the Adventure Therapy Treatment group, with a small positive overall effect of .09. The greatest effect was on academic outcomes (.26), followed by clinical (.20), family development (.20), social development (.10), self-concept (.05), physical (.03), and behaviour (-.10) outcomes. Although relatively small, the positive overall effect suggests that the lead up to the start of an adventure therapy program is for most participants a positive experience that results in a slight improvement for most outcomes. This finding is in contrast to Hattie et al. (1997) who found a small negative effect (-.05) between Base and Pre for outdoor education.

The Pre-Post time-comparison indicated the short-term effect of the program, with data available for all three treatment groups. Pre-Post outcomes are reasonably consistent across all eight major outcome categories for the Adventure Therapy Treatment group, with the greatest effect on clinical outcomes (.50), followed by academic (.43), social development (.42), behaviour (.42), self-concept (.41), physical (.38), family development (.37), and morality/spirituality (.18) outcomes. These findings, as well as the overall effect of .47, are largely consistent with previous unpublished adventure therapy meta-analyses (mid .4; Baker, 2011; George, 2011; Staunton, 2003), and compare favourably with outdoor education (mid .3; Cason & Gillis, 1994; Hans, 2000; Hattie et al., 1997). However, findings, for the most part, are not as strong as for one-on-one psychotherapy (see Lipsey & Wilson, 1993). The Alternative Treatment Pre-Post effects for outcome categories ranged from -.19 (family development) to .16 (self-concept), with a relatively small positive overall effect of .13. The No Treatment group Pre-Post effects for outcome categories ranged from -.05 (behaviour) to .06 (family development), with a very small positive overall effect of .03. Thus, the findings for the Adventure Therapy Treatment group compared favourably against the negligible effects of the Alternative and No Treatment groups (< .1), highlighting that on the whole there are beneficial outcomes associated with participating in adventure therapy programs.

The Post-Follow-Up time comparison provided an indication of the longer term effect of the program, with data obtained for the three treatment groups. The greatest Post-Follow-Up effect of the Adventure Therapy Treatment was on morality/spirituality outcomes (.63), followed by behaviour (.23), physical (.19), academic (.04), clinical (.02), social development (-.02), self-concept (-.01), and family development (-.05) outcomes. Although relatively small (.05), the positive overall effect suggests that, on average, the impact of adventure therapy programs appear to be maintained in the long-term. This finding is lower than Hattie's et al. (1997) previous finding (.17) for outdoor education. In contrast, the Alternative Treatment Post-Follow-Up effects for outcome categories ranged from -.20 (physical) to .17 (behaviour), with a very small negative overall effect of -.03. Similarly, although slightly lower, the No Treatment Post-Follow-Up effects for outcome categories ranged from -.27 (clinical) to .14 (family development), with a very small negative overall effect of -.08. This suggests that for those who participated in alternative treatment, the effects were only partially retained, and on average participants seemed to experience a slight decline in the gained benefits over the long-term. Similarly, for those who did not participate in any treatment, although there was minimal positive change between pre and post, on average participants seemed to experience a slight decline in overall wellbeing and functioning over the long-term. These findings therefore favourably suggest that, on average, adventure therapy is an effective treatment resulting in outcomes which appear to be maintained over the long-term.

### Moderators

The breakdown of overall Pre-Post effect sizes for the Adventure Therapy Treatment by sample, participant and program variables indicated that, in most instances, there are no clear or notable trends. In general, higher effects were found for samples which were published or had a lower MQRS rating, for participants who were older or female, and for programs whose use of adventure was adjunctive, or had an open group structure or private placement. However, the results indicate that, on the whole, sample, participant and program variables do not greatly moderate the effectiveness of adventure therapy programs. Thus, findings from the moderator analysis provide further support for the overall moderate effectiveness of adventure therapy. Additionally, these results support the use of findings from this study for benchmarking program effectiveness. Neill (2003) suggested that meta-analytic benchmarks be used to provide a systematic means to categorise and evaluate outcomes. Valuable diagnostic information about a program's relative efficacy can be obtained by comparing a particular program's effect sizes with appropriate meta-analytic benchmarks.

### Limitations and Recommendations for Future Research

This study demonstrated that adventure therapy programs are, on the whole, an effective intervention. However, important limitations of this study and meta-analytic analysis in general must be considered when interpreting results. Limitations pertain to availability of studies, heterogeneity, generalisability, type of data provided by empirical studies (including the provision of sufficient statistical information to calculate effect sizes), and the methodological quality of studies, (including the use of psychometrically validated assessment tools). Each of these are briefly discussed below.

These results are preliminary as the authors are still in the process of obtaining additional existing accessible empirical studies.

A substantial proportion of the findings were heterogeneous, indicating a medium to high degree of variance in the effectiveness of adventure therapy programs, as well as a sizable amount of discrepancy between studies claiming to measure the same outcome.

Only a small percentage of adventure therapy programs undergo empirical program evaluation (Neill [2003] indicates less than 1%), thus these findings may not accurately represent actual adventure therapy programming outcomes.

A substantial percentage of studies included in the meta-analysis did not use matched samples when reporting outcomes (i.e., there was a discrepancy between pre *N* and post *M*). Very few of these studies also provided matched sample results. For the current study, the smaller *N* was used in order to be conservative. Although participant attrition is a reality of program evaluation, in order to gain an accurate program evaluation, it is recommended that future empirical studies provide matched sample results. When matched samples are reported, it is important that drop outs are enumerated, otherwise the results run the risk of selectively reporting on completers only.

Although over 230 studies have been used in previous related meta-analyses (a list of these studies can be downloaded from Bowen, 2012), and over 1,000 related studies were obtained in the literature search for this study, only a small percentage of these provided enough data to calculate Pre-Post effects sizes. Further, a substantial proportion of studies did not provide adequate demographic information to allow for accurate moderator analysis. It is therefore imperative that future empirical studies provide the necessary statistics to allow calculation of effect sizes in order to reduce sample bias and increase generalisability of findings. Researchers should also, where appropriate, provide sample, participant and program demographics listed in Table 2, 3, and 4, respectively. It is also recommended that future research capture, where possible, data about a larger range of outcomes at multiple time points, in order to provide further understanding of the effect leading up to participating in an adventure therapy program, the effect of the program itself, and the resultant longer term effects.

One noteworthy issue is that there are two different kinds of effect sizes commonly used in meta-analytic studies. The standardised mean change or Pre-Post effect size indexes the difference between Pre-Post using only a single treatment group. Alternatively, the standardised mean difference effect size indexes the difference between a treatment group and a comparison group after treatment. These two different kinds of effect sizes are calculated the same way (by subtracting means and then dividing by the standard deviation), but they are two quite different types of effect sizes. The standardised mean change effect size provides an indication of the degree of change over time in a single group, while the standardised mean difference effect size provides an indication of the differences between two separate groups. S. J. Wilson (personal communication, June 13, 2012) argued that it is never appropriate to combine these two distinct types of effect sizes into one aggregate mean effect size. Although a number of previous meta-analyses in this area of research have combined these two types of effect sizes, this study only used the standardised mean change effect size. This meant that studies which only reported post-test results for the treatment and control groups were not included in this study (*N* = 47). A list of these studies can be downloaded from Bowen and Neill (2012).

The average MQRS score was moderate (7.06), with only nine studies achieving a high rating (12-16). In order to progress as a profession it is essential that high quality research is conducted to strengthen the reliability and validity of results and provide an accurate estimate of adventure therapy program effects. It is recommended that those conducting future research of adventure therapy programs consult such resources as the MQRS when designing the research project. Gass et al. (2012) also provided a rubric for evidence-based research on adventure programs in Appendix D, which could be similarly used.

While the majority of studies utilised psychometrically validated assessment tools and reported the psychometric properties, several studies used less developed assessment tools. It is possible that these less developed tools inflate or reduce the overall effect size depending on the capacity of the tool to assess the specified construct. It is recommended that psychometrically validated assessment tools are used in research on adventure therapy, and that the psychometric properties of tools are reported in resultant manuscripts. It is also recommended that future research rigorously develop purpose-built, multidimensional assessment tools using the best available psychometric techniques.

### Conclusion

These results provide the most substantial and robust meta-analysis of adventure therapy program outcomes to date and confirm that overall adventure therapy is moderately effective in facilitating positive short-term change in behavioural, emotional, and interpersonal measures which, for available studies, on average appears to be maintained in the

long-term. Heterogeneity of outcomes indicates considerable variability, although little of variance appears to be explained by the measured moderators.

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