Adventure Education and Outward Bound: Out-of-Class Experiences That Make a Lasting Difference

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The purpose of this meta-analysis is to examine the effects of adventure programs on a diverse array of outcomes such as self-concept, locus of control, and leadership. The meta-analysis was based on 1,728 effect sizes drawn from 151 unique samples from 96 studies, and the average effect size at the end of the programs was .34. In a remarkable contrast to most educational research, these short-term or immediate gains were followed by substantial additional gains between the end of the program and follow-up assessments (ES = .17). The effect sizes varied substantially according the particular program and outcome and improved as the length of the program and the ages of participants increased. Too little is known, however, about why adventure programs work most effectively.

The use of outdoor experiences for educational purposes has a rich history. Plato extolled the virtues of outdoor experiences for developing healthy bodies, which would lead to healthy souls. Like many outdoor adventure programs, Plato considered that the aim of physical education was not primarily to enhance physical skills and that it had a higher educational value: "The moral value of exercises and sports far outweighed the physical value" (Plato, 1920, p. 6). Rhoades (1972) argued that the most compelling reason for using the natural environment is that it requires certain responses which are of value: "cooperation, clear thinking and planning, careful observation, resourcefulness, persistence and adaptability....These responses are not demanded by the environment, per se, but rather the manner in which the program forces students to interact with the environment" (p. 26). Others are more romantic:

> In city and urban areas children "find" themselves all too rarely in the country. Their sentient selves are got at only through the artifacts of their environment. The gymnasium, athletic track and swimming pools are ameliorators of our synthetic living, but they are not the same as rocks, rivers and trees. (Arnold, 1970, p. 10)

There has been a marked increase in the number of adventure programs during the past 40 years. Over 200 Outward Bound adventure-based programs were

operating in the United States by 1975 (Ewert, 1983). A decade later there were 542 wilderness-related courses offered by U.S. universities (Hendee & Roggenbuck, 1984), and in 1994 over 40,000 students participated in Outward Bound programs alone worldwide. Thus considerable resources of participants and staff and associated time, personal energy, and finances are spent on these programs. Since the 1950s many wilderness- and adventure-based programs have been developed to provide, among other things, rehabilitation and/or enriching experiences for many groups, including psychiatric patients, delinquents, and those involved in management training.

Most researchers trace the origin of modern adventure education to Kurt Hahn (1957). In 1941 Hahn devised the first Outward Bound program for the Blue Funnel Shipping Line to reduce the loss of lives due to sinkings of their ships in the Atlantic Ocean. A month-long course was designed to accelerate the development of independence, initiative, physical fitness, self-reliance, and resourcefulness. The success of these programs led Hahn to support the establishment of Outward Bound schools in England and then throughout the world; by 1995 there were 48 schools on five continents. In addition, Hahn set up many other schools such as Gordonstoun in Scotland, Anavryta College in Greece, and Salem and Luisenlund in Germany and helped to establish the Duke of Edinburgh Awards and the network of United World Colleges. These schools emphasize the role of character, service, challenge, and physical endeavor, and many have adopted the theme espoused by William James (1967) in his search for the "moral equivalent of war." Hahn claimed that the aim of Outward Bound was to "enthrall and hold the young through active and willing Samaritan service, demanding care and skill, courage and endurance, discipline and initiative" (p. 10).

The common features of adventure programs are (a) wilderness or backcountry settings; (b) a small group (usually less than 16); (c) assignment of a variety of mentally and/or physically challenging objectives, such as mastering a river rapid or hiking to a specific point; (d) frequent and intense interactions that usually involve group problem solving and decision making; (e) a nonintrusive, trained leader; and (f) a duration of 2 to 4 weeks. The most striking common denominator of adventure programs is that they involve doing physically active things away from the person's normal environment. The names for these activities are remarkably varied and include *adventure education, exploration schemes, mountain centers, survival courses,* and *wilderness courses,* to cite but a few (see Hogan, 1968). In this article the generic names *adventure programs* and *adventure education* are used to encompass these forms of education.

Given the rapid increase in adventure programs that utilize challenge in the outdoors as an integral and critical part of their educational method, it is worth asking about their effectiveness. This article aims to identify the outcomes most influenced by the adventure programs, investigate the differences between particular programs, and discuss the major educational processes that lead to the outcomes. We have used both a traditional review of the literature and a meta-analysis and have aimed to use both types of review to complement each other in providing a rich tapestry of information about the effects of adventure programs. From a methodological standpoint, we also aim to demonstrate how meta-analysis can be used as a procedure for evaluating adventure programs. To exemplify the nature of adventure education, the Australian Outward Bound programs are

described. The Australian Outward Bound program was chosen because it is one of the largest Outward Bound schools in the world and it has the most extensive program evaluation information.

The Australian Outward Bound Program: An Example

In 1956 the first 26-day Outward Bound standard course for 16- to 19-year-olds was conducted in Australia. Today, over 7,000 participants per year complete Australian Outward Bound programs. These Australian programs claim to build an educational philosophy around the motto "To serve, to strive, and not to yield." The programs involve expeditions by land, sea, or river and include activities such as bush walking, caving, rock climbing, rappelling, orienteering, canoeing, rafting, cascading, completing ropes confidence courses, horse riding, mountain biking, cross-country skiing, and sailing. In almost all cases, these physical skills are taught as a means of impelling participants, usually operating in semiautonomous groups of 8 to 16, into challenging and demanding situations requiring effort, determination, cooperation, and self-reliance. Participants are made responsible for most logistics including meal planning, expedition preparation, equipment maintenance, reacquiring supplies, and problem solving as the program progresses.

Initial training is given in such areas as physical fitness, first aid, bush rescue, nutrition and hygiene, communication skills, navigation, goal setting, bush craft, and expedition planning. Early in the program of increasingly difficult experiences, the group instructor plays a relatively didactic role; however, a guided discovery learning approach is soon implemented. By the last week of the course, participants operate in smaller groups of 4 to 8, largely independent of their instructor and taking responsibility for all aspects of their expedition.

While the physical nature of the outdoor activities is a part of the program, physical fitness and physical skills are not the primary goals. The claim is that physical activities can be used as an effective medium for participants to recognize and understand their own weaknesses, strengths, and resources and thus find the wherewithal to master the difficult and unfamiliar in other environments. Overt competition is deemphasized, and the focus is on competition within the individual and cooperation among the group members to achieve greater personal goals. The establishment and fulfillment of personal and group goals in outdoor physical activities, the group experience, and the opportunity to experience and master stressful situations are all important components of adventure programs in general and the Outward Bound program in particular.

The Research on Adventure Programs

In searching for articles to include in this review we were struck by the number of research papers that read more like program advertisements than research. Where there was some attempt at evaluation beyond anecdotal evidence, the analyses were rarely more than correlational. Many policymakers have recently called for accountability information (particularly in light of some recent deaths and disasters which have occurred during some adventure programs), and one desirable outcome of these edicts might be enhanced quality of research on adventure programs. Our hope is that the benchmarks presented in this article will provide an incentive for others to undertake more comprehensive research on

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adventure programs.

The earliest research was related to "making men out of boys," with little involvement of girls (although the first Outward Bound course for girls commenced in the early 1950s, and the first school for girls opened in the early 1960s). Early research was based mostly on simplistic homilies that, for example, Outward Bound must be successful (e.g., Hahn, 1957); descriptions of the programs (Miner & Boldt, 1981); testimonials from the converted (D. James, 1957; Wilson, 1981); and committed endorsements from selected ex-students. In one of the earliest syntheses of this evidence, Fletcher (1971) reported, "After I had talked to some 500 students, I was obliged to accept their nearly unanimous view that attendance at a course would influence them for many years. I received this impression at first with incredulity, but was obliged to pay attention to it because the same view was expressed, only more strongly, by past students" (p. 98). Despite his exhaustive surveys, Fletcher nevertheless found the programs wanting in measurable effects.

Such negative evidence may have made adventure program personnel cautious about using more systematic evaluation models, and the 1970s were plagued with what Kimball (1979) termed "soft" forms of evaluation, such as narrative accounts and case studies. Walsh and Golins (1976), for example, argued that there was a need to keep the Outward Bound program mysterious, as "any codification of the process tends, by its simplification, to deny access to mystery. Once the idea is delineated, its ability to move out of that mold is decreased" (p. 22). It is important to emphasize that qualitative approaches to research need not be soft, but should be systematic and rigorous.

During the 1970s, there was a growing awareness that the impact of adventure programs was due to changes in the self-perceptions of the participants and to the way each person absorbed the experiences into his or her self-structure. Enhancement of self-concept became the primary aim. The evidence was generally supportive (see Ewert, 1983), although the research ignored the advances that were being made at that time in self-concept theory and measurement (e.g., Shavelson, Hubner, & Stanton, 1976) and thus tended to be simplistic. During this decade, adventure programs were variously described as forms of sensitivity training (Lewicki, 1977), simply a wilderness adventure movement (Lowenstein, 1975), a new form of "progressive education" (Nold, 1976), and part of the newly fashionable "experiential movement" (Leiweke, 1976). In the climate created by such views, issues such as reliability, validity, and dependability of data seemed awkward and irrelevant.

Since this time there have been piecemeal attempts to look at outcomes, usually involving one-off studies using before-and-after comparisons with small samples and ignoring interesting independent variables such as length, instructor experience, and differences between programs. There has only been one meta-analysis of adventure programs: Cason and Gillis (1994) reported a meta-analysis of adventure programs for students ranging in age from 11-year-olds to college freshmen. They included 147 effects based on 43 studies from throughout the world. They found an average effect size of .31. The effects of most outcomes were high: self-concept (.34), behavioral assessments by others (.40), locus of control (.30), grades (.61), and school attendance (.47). The only program effect they identified as moderating their conclusion was length of program: Longer

programs had higher effects (.58) than medium (.19) and short (.17) programs. There were no differences between various types of participants (e.g., adjudicated, inpatients, emotionally or physically challenged, and "normal" adolescents), but effect sizes from higher-quality studies tended to be greater than those from lower-quality studies.

Outcomes of Adventure Programs

There have been a plethora of outcome measures used to evaluate adventure programs. We identified 40 major outcomes in the adventure literature, which can be placed into 6 more encompassing categories: leadership, self-concept, academic, personality, interpersonal, and adventuresomeness. Table 1 presents these categories, the 40 major outcomes, and examples of the specific outcomes coded under these outcomes.

Most research on the adventure experience has tended to use either single outcome measures or omnibus measures, with all outcomes regarded as equally important. It is more likely that those scales more directly relating to the expected outcomes will change, and that those unrelated are at best control variables that assess whether some influence other than the adventure program is causing changes (Marsh, Richards, & Barnes, 1986a, 1986b).

Moreover, it may be only parts of the adventure program and not necessarily the total experience that make the difference. Scherl and Smithson (1986), in one of the rare studies on this topic, used fuzzy set theory to investigate the changes during an Outward Bound program. Participants were asked to keep log books in which they recorded their impressions and feelings as the program progressed. Scherl and Smithson demonstrated that changes to self-concept were primarily related to effort. That is, 46% of the time that the category "effort" was used by participants, there was also a reference to self. Further, this effort was primarily mental rather than physical, and it was primarily due to investing mental energy into devising coping strategies. Scherl and Smithson claimed that

> the exertion of mental and physical effort is directing one's attention to oneself. However, this is a very specific type of awareness about the self; that is, when people exert physical and mental effort in that context, they look at themselves mainly in terms of coping. (p. 8)

Moreover, low-arousal, negatively toned emotions seem to be more effective in bringing attention to the self, and the self is referred to more often in the context of negatively toned emotions than in the context of positive ones. Scherl (1988) also used multiple administrations of repertory grids to identify the aspects of the experience that were most salient to participants. Most salient were emotional responses and level of arousal, a distinction between self and group, and a cognition that effort (either physical or mental) was part of the experience.

The Magnitude of the Changes Attributed to Adventure Programs

There have been many studies in which the differences between pretest and posttest (or across adventure and comparison groups) have not been statistically significant but the authors have claimed that the effect is most obvious. For example, in a study of a 110-day expedition along the Appalachian Trial using 58 college students, Doyle (1981) hypothesized that "expedition members would

TABLE 1
Categories, subdomains, and examples of the major outcomes in adventure research

Category/subdomain	Examples or other names
A. Academic	
1. Academic-direct	Mathematics, reading
2. Academic-general	GPA, problem solving
B. Leadership	
3. Conscientiousness	Attention to detail
4. Decision making	Reasoned decision making
5. Leadership-general	Task leadership
6. Leadership-teamwork	Seek and use advice, consultative leadership
7. Organizational ability	Organizational competence, active initiative
8. Time management	Time efficiency
9. Values	Values orientation
10. Goals	Setting goals
C. Self-concept	
11. Physical ability	
12. Peer relations	Self peers, self-same sex, opposite sex self-concept
13. General self	Self-values, self-general, self-esteem, self-concept
14. Physical appearance	
15. Academic	Self–problem solving
16. Confidence	Potency, emotional self
17. Self-efficacy	Self-control, self-sufficient, self-reliance
18. Family	Self-parents, self-home
19. Self-understanding	Self-honesty, self-disclosure, self-criticism, self-awareness
20. Well-being	Life success, satisfaction, positive endeavor
21. Independence	Autonomy
D. Personality	
22. Femininity	
23. Masculinity	
24. Achievement motivation	
25. Emotional stability	Emotional control, emotional understanding
26. Aggression	Reduce aggression
27. Assertiveness	Forthrightness
28. Locus of control	Internal locus of control
29. Maturity	
30. Neurosis reduction	Non repression, defensive, reduction in malaise
E. Interpersonal	
31. Cooperation	Productive teamwork, group cooperation
32. Interpersonal communication	Likeability, trusting and listening
33. Social competence	Social aptitude, sociability, friendliness
34. Behavior	Positive behavior, reducing behavior problems
35. Relating skills	Evaluation from others, sensitivity to others
36. Recidivism	Reduction in recidivism
F. Adventuresome	
37. Challengeness	Venturesome, challenge seeking, adventurousness
38. Flexibility	Openness to new ideas, adaptability, resourceful, imaginative
39. Physical fitness	Sit-ups, physical ability, resting pulse, physical strength
40. Environmental awareness	Wilderness appreciation, in tune with nature

exhibit a significant change resulting in a more positive self-concept, a more positive locus of control, and increased benevolence. It was also hypothesized that the expedition group would change significantly more than the two comparison groups" (p. 1022). Even though the trends were in the predicted direction, the research findings showed no statistically significant differences in self-concept, locus of control, or benevolence either between the expedition and two comparison groups or between the preentry and end-of-course scores. The conclusion, however, was that "based on qualitative data, the expedition was an intense learning experience not found in the traditional classroom offering" (p. 1022). This emphasis on positive findings and ignoring of negative evidence is disturbingly common.

There is no doubt that the major interest for many evaluators of adventure programs relates to the magnitude of the change, and this has been often incorrectly expressed in terms of statistical significance. This ignores the major issue of the power of the study, which relates to the probability that a statistical test will yield statistically significant results if they are in fact present. Power is a function of the probability of mistakenly rejecting the null hypothesis, the sample size, and the expected magnitude of the difference between pretest and posttest means. Given the small samples in much of adventure program research, the resulting power must of necessity be low. We estimated that the average power of the studies in our meta-analysis was .65 at the two-tailed .05 level for medium effect sizes (i.e., .5 *SD*). This is far below the accepted level of .80, and it is perhaps no surprise (given the low sample sizes) that evaluators sense major change but are frustrated at not detecting statistical significance.

An alternative methodology is to statistically synthesize the many studies and address the magnitude of change across and within programs. Meta-analysis has been advocated as the method to undertake such a synthesis, and this article outlines a meta-analysis of adventure programs that avoids the pitfalls of using small samples, capitalizes on the diversity of outcomes and programs, and is not as concerned with statistical significance (as the power of the meta-analysis comes from the number of effect sizes and not necessarily from the size of sample from any one study). Meta-analysis can also assess major moderator variables, such as effects across programs, and it will be suggested that it can be used to assess the caliber and effectiveness of the trainers, the diversity of settings, and outcome variability among participants.

Method

Extensive searches were made of databases such as PsycLIT, *Dissertation Abstracts International,* and ERIC. Requests were made via the Internet, secondary sources were examined, and the major library holdings at the Outward Bound Australian National School were searched. The extensive research files that the Australian National Base has kept on its programs over the past 20 years were also accessed. We were able to locate 96 unique studies.

Meta-analysis is a procedure designed to synthesize the findings across many studies, assess the effects of various moderators, and ascertain the major sources of variability in the program effects. Glass, McGaw, and Smith (1981) and Hedges and Olkin (1985), among many others, have presented standard texts on the methodology. The fundamental unit of analysis is the effect size; all other statis-

tics are converted into this standard metric. The effect size is the difference between either (a) the mean of the measure administered at the outset of the program (usually the first morning) and the mean of the outcome measure administered weeks or months before the program (prior effects); (b) the mean of the outcome measure at the end of the adventure program and the mean prior to commencing the adventure (the immediate effects of the program); or (c) the mean of the outcome measure administered at some follow-up many weeks after the cessation of the program and the posttest mean (follow-up effects). In all cases, this difference between means is divided by the appropriate pooled group standard deviation, and the sign of the difference is positive when the treatment has a positive effect. The effect sizes were corrected for bias (as the gs overestimate the population effect size, particularly in small samples) using Hedges's correction (Hedges & Olkin, 1985).

To determine whether each set of effect sizes shared a common effect size (i.e., was consistent across the studies), a homogeneity statistic Q_W was calculated, which has an approximate chi-square distribution with $k - 1$ degrees of freedom, where k is the number of effect sizes (Hedges & Olkin, 1985). Given the large number of effect sizes that are combined into the various categories and the sensitivity of the chi-square statistic to this number, it is not surprising that nearly all homogeneity statistics are significant. To indicate the degree of departure from the expected value, the ratios of the chi-square to the degrees of freedom have been calculated, and these provide an indication of how many standard errors the chi-square is from the expected value.

We then used categorical models to determine the relation between the study characteristics and the magnitude of the effect sizes, using the procedures outlined by Hedges and Olkin (1985). These models provide a between-classes effect (analogous to a main effect in an ANOVA design) and a test of homogeneity of the effect sizes within each class. The between-classes effect, which can be used to assess differences between classes, is estimated by Q_B, which has an approximate chi-square distribution with $p - 1$ degrees of freedom, where p is the number of classes. The tables reporting tests of categorical models also include the mean weighted effect size for each class, calculated with each effect size weighted by the reciprocal of its variance, and the 95% confidence interval of this mean. If this confidence interval does not include zero, then the mean can be considered significantly different from zero.

In the following Results section we have included not only the results from the meta-analysis but also a traditional review to provide a flavor of the research studies. The overall results are reviewed, and they are compared to other educational experiences. As with most meta-analyses, the interactions with other variables are often more informative than any overall means. The following sections document the results from many such interactions, and they are grouped under generic headings: the qualities of the studies, the participants, the programs, and the outcomes. Finally, subset regression and other methods are used to assess which interactions are most critical to explaining the overall results.

Prior to discussing any results, there were two decisions that impacted the choice of studies in this meta-analysis. Criteria such as sample size, presence of controls, descriptions of methodology, and quality of instrumentation were agreed upon by the authors, who then rated the quality of the studies as low, medium, or

high. There were nine studies that all four authors agreed were of very low quality, and the means from these studies were so deviant from the others that they were excluded.

Second, as we were collecting studies for this meta-analysis, it became apparent that while school-aged participants in Outward Bound or other adventure programs were appropriate for inclusion, school-based outdoor education programs should not be included in this analysis. These outdoor education programs were typically of shorter duration and tended to involve nonchallenging experiences out of the classroom, and the results were most deviant from the more challenging adventure programs. For example, McIntyre (1988) outlined a 7-week program on a rural retreat that involved tending the farm, building projects, bush walks, camping, and natural science studies. All effects from the low-quality studies and from outdoor education programs (except where explicitly used for comparison purposes) were excluded from the meta-analysis.

Results

Overall Results

We were able to estimate 1,728 effect sizes, based on 151 unique samples located within 96 studies published between 1968 and 1994. There were approximately 12,057 unique participants ($M = 80$ per study), of whom 72% were male and 28% female. The majority (75%) of participants were classified as adults or university students (it was often difficult to distinguish between these two groups), and their age was 22.28 ($SD = 6.43$, range of 11 to 42 years).

The programs lasted between 1 and 120 days, with a mean of 24 days ($SD = 16$). Seventy-two percent of the programs were between 20 and 26 days in length. Most of the effects compared the immediate effects of the program (1,062, or 62%), a further 316 (18%) compared responses collected about 1 month before the program, and 350 (20%) assessed the follow-up effects of the program. A summary of all studies and their major characteristics is presented in Table 2.

Prior effects. When the effects of adventure programs are assessed, it may be that the differences between pretest and posttest means are misleading because of problems with the timing of both measures. If the pregroup measure is taken during the first sessions of the adventure experience, it is possible that the anticipation, sense of excitement, and/or trepidation of confronting something so different and challenging may lead to depressed scores on many measures. For example, these anticipations could decrease confidence in self, heighten anxiety, decrease perceptions of interpersonal skills (particularly when confronted by strangers), lower efficacy of leadership skills, and reduce estimations of physical competence to cope with the days ahead (e.g., Huie, 1983; Marsh et al., 1986a, 1986b; Richards, 1977). Hence, it may be desirable to assess the pretest competence a few weeks prior to the first day.

However, the results (Table 3) indicate little or no systematic prior effects. As well as the small size of the overall effect, the chi-square ratio indicates that these effects cluster closely around the mean of −.05. This lack of effect was consistent across background of the participant (e.g., age, gender, country), type of program, and type of outcome. Based on these findings, there seems to be little advantage to administering outcome measures prior to the first day of the program.

TABLE 2
Characteristics of the studies

Authors	Year	Age	Background	Country	Days	Program	Total No.	Before No.	Before Mn.	Program No.	Program Mn.	Follow-up No.	Follow-up Mn.	Total No.	Total Mn.
Bacon	1987	Uppersec	Normal	America	20	Outward Bound	67			7	.07			7	.07
Bacon	1988	Secondary	Normal	America	20	Outward Bound	66			7	.21			7	.21
Bauer	1982	Uppersec	Normal	America		Outward Bound						1	.07	1	.07
Bronson, Gibson, Kichar, & Priest	1992	Adults	Managers	America	3	Adventure	17			10	.55			10	.55
Burdsal & Force	1983	Lowersec	Normal	New Zealand	45	Adventure	132			12	.36			12	.36
Campbell, Rily, & Easthope	1981	Uppersec	Normal	America		Outward Bound						1	.06	1	.06
Chenery	1981	Primary	Normal	America	53	summer camp	77			1	.09			1	.09
Collingwood	1972	Uppersec	Delinquent	America	21	Outward Bound	19			5	.28			5	.28
Cytrynbaum & Ken	1975	Uppersec	Normal	America		Outward Bound						1	.21	1	.21
Drebing, Willis, & Genet	1987	University	Normal	America	15	Outward Bound	30			1	.50			1	.50
Felstead	1987	Uppersec	Delinquent	OB Australia	26	Outward Bound	36			5	.51	1	-.22	6	.39
Fry	1993	Adults	Normal	OB Australia	26	Outward Bound	26			2	.41			2	.41
Gass	1987	Adults	Normal	America	7	Adventure	96			6	.39			6	.39
Gass	1990	Adults	Normal	America	7	Adventure	32			1	.23			1	.23
Gass	1991	Uppersec	Normal	America		adventure camp	961					2	.07	2	.07
Gibson	1981	Secondary	Delinquent	America	21	Outward Bound	89			1	.45			1	.45
Gillette	1971	University	Normal	America	21	Outward Bound	34			12	.06			12	.06
Goldman & Priest	1991	Adults	Normal	America	1	abseilling	27			2	.31			2	.31
Gouvernet	1988	Lowersec	Normal	OB Australia	23	Outward Bound	16	10	.22	10	-.44	7	-.21	27	-.30
Hendy	1975	Uppersec	Normal	America	26	Outward Bound	107			16	.09	16	-.01	32	.04
Hileman	1979	Uppersec	Normal	America	1	Outward Bound						1	.08	1	.08
Kaplan	1972	Secondary	Normal	America	14	Outdoor Challenge	10			1	.08			1	.08
Kaplan	1984	Uppersec	Normal	America	10	Outdoor Challenge	47			5	.26			5	.26
Kelly	1974	Uppersec	Normal	America		Outward Bound						1	.07	1	.07
Kelly & Baer	1968	Uppersec	Delinquent	America	26	Outward Bound	83			10	.14			10	.14
Kelly & Baer	1971	Uppersec	Normal	America		Outward Bound						1	.11	1	.11
Kimball	1979	Uppersec	Delinquent	America	17	Outward Bound	23			12	.13			12	.13
MacKay	1981	Secondary	Normal	Australasia	4	Outdoor Education	39			2	.10			2	.10
							24			8	.06	2	-.04	10	.04
							18			3	.07			3	.07
							101			2	.06			2	.06
Marsh & Richards	1986	Adults	Normal	OB Australia	26	Outward Bound	71			19	.33			19	.33
Marsh & Richards	1987	Adults	Normal	OB Australia		Outward Bound	198	4	.05	6	.16			10	.12

Study	Year	Level	Sample	Location	n	Program	N	k	ES	k	ES	k	ES	k	ES
Marsh & Richards	1988	Uppersec	Low achievers	OB Australia	42	Outward Bound	66	4	−.04	6	.20	29	.39	10	.10
Marsh & Richards	1990	Adults	Normal	OB Australia	26	Outward Bound	43			14	.80			29	.39
Marsh, Richards, & Barnes	1986	Adults	Normal	OB Australia	21	Outward Bound	280	13	−.04	14	.11			14	.80
Mason-Cox	1992	Adults	Normal	OB Australia	24	Outward Bound	361			1	.62			27	.04
Mitchell & Mitchell	1988	Adults	Normal	OB Australia	24	Outward Bound	48	13	.04	26	.20	78	.25	1	.62
Nussbaumer	1988	Secondary	Normal	Australasia	2	Outdoor education	591	7	−.04	7	.18	7	−.29	117	.22
							121			7	.13			21	−.05
							59			−7	.14			7	.13
							19			−7	.25			7	.14
							17			−7	−.03			7	.25
							65							7	−.03
Owens & Richards	1979	Adults	Normal	OB Australia	26	Outward Bound	80			10	.50			10	.50
Parle	1986	Lowersec	Normal	OB Australia	10	Outward Bound	91			9	.15	8	.01	17	.08
Porter	1975	Uppersec	Delinquent	America	8	Outward Bound	34			2	.50	2	.41	4	.46
Richards	1987	Adults	Normal	OB Australia	26	Outward Bound	246	1	−.10	1	.32			2	.11
							109	1	−.11	1	−.00			2	.06
							333	1	.01	1	.07			2	.04
							112	1	−.15	1	.10			2	−.02
Richards	1990	Adults	Normal	OB Australia	10	Outward Bound	18	8	−.08	8	.34	8	.78	16	.56
Richards	1990	Adults	Managers	OB Australia	10	Outward Bound	106	8	−.18	8	.14	8	.03	24	.03
Richards	1990	Adults	Normal	OB Australia	26	Outward Bound	28	8	−.21					8	−.18
							147			7	.68			7	.68
							181			1	.95			1	.95
							10							8	−.21
							80			4	.53			4	.53
							79			2	.65			2	.65
Richards	1990	Adults	Normal	OB Australia	26	Outward Bound	35			2	.95			2	.95
							42			2	.43			2	.43
Richards & Neill	1993	Adults	Normal	OB Australia	26	Outward Bound	250			11	.82			11	.82
							64			11	.72			11	.72
Richards & Neill	1993	Adults	Normal	OB Australia	26	Outward Bound	196	15	−.06	15	.81			30	.38
Richards & Neill	1993	Adults	Normal	OB Australia	26	Outward Bound	88			19	.77			19	.77
							16			19	.14			19	.14
							12			19	.46			19	.46
							6			19	.15			19	.15
Richards & Neill	1993	Adults	Normal	OB Australia	26	Outward Bound	64			1	.77			1	.77
							56			1	.14			1	.14
							12			1	.45			1	.45
							6			1	.15			1	.15
Richards & Neill	1993	Adults	Normal	OB Australia	26	Outward Bound	389			12	.95			12	.95
							149			16	−.03			16	−.03
							49			16	.13			16	.13

TABLE 2 (*continued*)

Authors	Year	Age	Background	Country	Days	Program	Total	Before		Program		Follow-up		Total	
							No.	No.	Mn.	No.	Mn.	No.	Mn.	No.	Mn.
Richards, Barrett, & Brown	1990	Adults	Managers	OB Australia	6	Outward Bound	29	8	.04	8	.50	8	.47	16	.25
Richards, Barrett, Medhurst, & Smith	1991	Adult	Management	OB Australia	23	Outward Bound	12	8	−.08	8	.23	8	.02	24	.14
Richards, Barrett, Morrison, & Seidel	1992	Adult	Management	OB Australia	10	Outward Bound	45	8	−.07	7	.15	8	.01	24	.06
Richards, Barrett, Neill, & Seidel	1992	Adult	Normal	Australasia	10	Sailing	130	7	−.10	8	.19	7	.08	21	.05
Richards, Lee, & Barrett	1993	Adults	Managers	OB Australia	10	Outward Bound	14	8	.02			8	.24	24	.15
Ringer	1994	Secondary	Normal	Australasia	10	Outward Bound	73			2	.49			2	.49
Sachs & Miller	1992	Uppersec	Delinquent	America	3	Wilderness	16			4	.69	4	.29	8	.49
Sakofs	1992	Lowersec	Delinquent	America	21	Wilderness	115			8	.79	20	.34	28	.47
Sakofs & Shurman	1991	Secondary	Delinquent	America	20	Wilderness	119			24	.16			24	.16
Smathers	1975	Adults	Normal	America	18	Outward Bound	10			3	.18			3	.18
Smith	1976	Secondary	Normal	America	21	Outward Bound	65			10	.05			10	.05
Smith et al.	1975	Secondary	Normal	America	21	Outward Bound	477			12	.08			12	.08
Spacht	1982	Secondary	Normal	America	5	High adventure	92			1	1.69			1	1.69
Stuckey	1975	Adults	Normal	America	21	Outward Bound	39			6	.20			6	.20
Thorstenson & Heaps	1973	Secondary	Delinquent	America	26	Outward Bound	82			10	.52			10	.52
Thorvaldsen & Matheson	1976	Uppersec	Normal	America		Outward Bound	197			1	.08			1	.08
Thorvaldson & Matheson	1976	Adults	Delinquent	America	120	Forrest Camp	272			1	.08	1	.08	1	.08
Wetmore	1972	Secondary	Normal	America	21	Outward Bound	124			10	.08			10	.08
Wichmann	1991	Uppersec	Delinquent	America	30	Wilderness	72			10	.03			10	.03
Willman & Chun	1973	Secondary	Delinquent	America	42	Outward Bound	172			1	1.08			1	1.08
Willman & Chun	1973	Uppersec	Normal	America		Outward Bound				1	.90	1	.08	1	.90
Wright	1982	Uppersec	Delinquent	America	26	Outward Bound	23			1	.64			1	.64

Note. OB = Outward Bound.

TABLE 3
Effect sizes and summary information relating to time of testing

Time of the test	No.	Mean	−1.96 SE	+1.96 SE	H_T	Ratio
Before	316	−.05	−.29	.16	432.93	1.4
Program	1,062	.34	.09	.60	8,323.32	8.3
Follow-up	347	.17	−.03	.37	1,587.02	4.6
Overall	1,633	.23				

Immediate program effects. The overall immediate effect size from the various adventure programs is .34. An overall effect size of .34 is akin to (a) a 15% improvement in the rate of learning, (b) a correlation between an outcome variable and adventure experience of .15, (c) 65% of students who participate in an adventure program exceeding those who do not participate in such a program, and (d) a gain in outcome measures (with $SD = 10$) of about 3 points. Figure 1 presents a stem-and-leaf diagram of the effects, ordered from the smallest to the largest effect size.

An important alternative basis of comparison is the "typical" effects from other competing educational programs. The typical effect size of educational interventions, identified from a synthesis of over 300 meta-analyses (Hattie, 1987, 1992b, 1993), is .40 for achievement and .28 for affective outcomes (Table 4). Thus, the overall effect size from the adventure program of .34 is most comparable to achievement and affective outcomes from typical educational interventions. Furthermore (see Table 4), the effects of adventure programs on self-concept are greater than those typically found in classroom-based programs on self-concept.

Follow-up effects. It is possible that at the end of adventure programs participants typically experience elation or good feelings. Wetmore (1972), for example, reported that 95% of his sample, when asked to write critiques on the influence of the Outward Bound experience on their lives, reported favorable effects. Marsh et al. (1986b) called this phenomenon "post-group euphoria" and argued that measures taken immediately after an Outward Bound program (often on the last day) might be affected by this euphoria, particularly when the measures were self-report. To address this concern they recommended investigating the longer-term effects and the effects of scales not expected to alter as a consequence of the adventure program. In the latter case, if there are euphoric effects, then they are most likely to be reflected in increased scores (relative to pretest scores) on these less important or unrelated variables. Marsh et al. used four scales which were determined a priori to be less relevant to the program goals and reported that changes were least on these variables, which suggests that the other measures were unlikely to be as affected by the postgroup euphoric effect.

If the adventure program effects are long lasting, then follow-up studies would be expected to produce mean effect sizes of zero, indicating that the initial effects have been maintained. An effect size greater than zero would indicate that the effects continued to increase. The typical follow-up effect of adventure programs is positive ($M = .17$, over mean of 5.5 months), although there are marked variations between the various follow-up effects (Figure 2). It is critical to note that this effect size of .17 is in addition to the .34 that accrued from the program,

```
-1.8  7
-1.7
-1.6
-1.5
-1.4
-1.3
-1.2
-1.1  2
-1.0
 -.9  7
 -.8  93
 -.7  92
 -.6  41
 -.5  77110
 -.4  9996554410
 -.3  9886644443210
 -.2  99998877766554433333332222211110
 -.1  99999988877776666555554332221111000000000000
 -.0  000000000000000000011111222233333334444444455555555556666666677777777788888888889999999999
  .0  000000001111111111111111111112222222222222222233333333333333334444444455555555556666666677777777778888888889999999
  .1  000000000000000111111111111111122222222222233333333333334444444455555555556666666677777777777888888888899999999999999
  .2  000000000000000111111111111111112222222222223333333333333344444444445555555555566666666677778888888888899999999
  .3  00000000000111111111111222222222223333333333333344444444445555555555566666666677777777778888888889999999
  .4  00000000000111111111111222222222222333333333334444444455555556666666667777777778888888889999999
  .5  00000000000011111111111222222222233333333333444444455555566666666777777788888889999999
  .6  00000000001111111111112222222233333333334444444455555566666666777777788888899999
  .7  001122222222233333334444444455555566666666777777788888889999
  .8  0011222222333333334444445555666666666677777778888889
  .9  000001112222333344455667777778889999
 1.0  00013333444567889
 1.1  12256999
 1.2  4799
 1.3  125
 1.4  125
 1.5  2
 1.6  9
```

FIGURE 1. *Stem-and-leaf diagram of all effect sizes for the adventure programs*

TABLE 4
Effect sizes from various meta-analyses

Variable	No. effects	Mean	SE
Overall achievement in classrooms	165,258	.40	.02
Overall effective variables in classrooms	24,780	.28	.02
Overall self-esteem effects in classrooms	1,399	.19	.04
Overall self-esteem in psychotherapy settings	387	.37	.10

and that these effect sizes are additive. That is, a long-term effect size of .51 from precourse to follow-up can be expected. The effects of adventure programs continue to increase over time, and, as Figure 2 demonstrates, the effects are maintained over considerable time. The follow-up effects are different for adults (.14) compared with nonadults (.07), particularly for leadership (−.26 for nonadults and .17 for adults), personality (.26 for nonadults and .11 for adults), and interpersonal (.24 for nonadults and .11 for adults). These substantial follow-up effects are unlike most educational programs, where the typical follow-up effects are negative or at best zero and there is quick fading.

The Studies

Quality. It has been noted that the research literature on adventure programs are in much need of improvement. We coded each study as high or medium (the low-quality studies having been omitted) and thus assessed the effects of research quality on the outcomes. The means for effect sizes moderated by quality of the study are presented in Table 5. The mean effect sizes for medium- and high-quality studies were very close, and thus there is no need to separate the conclusions based on the quality of studies.
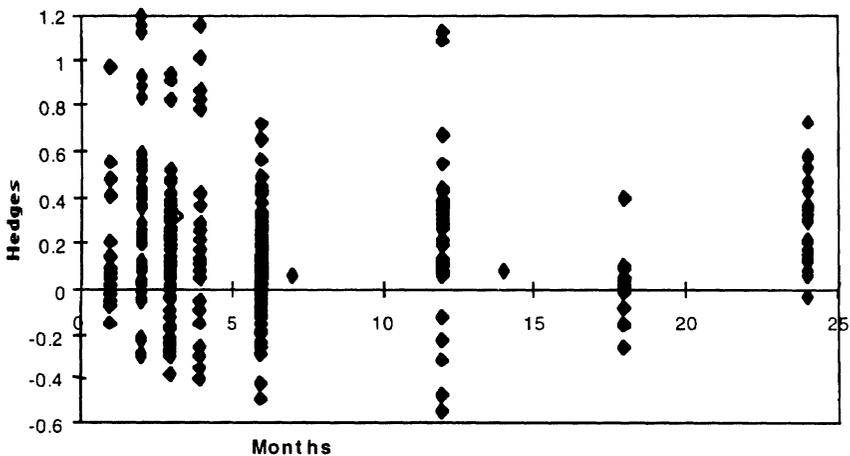

FIGURE 2. *Effect sizes of outcomes graphed according to time of follow-up*

TABLE 5
Effect sizes and summary information relating to quality of study

Quality of the study	No.	Mean	−1.96 SE	+1.96 SE	H_T	Ratio
Medium	1,206	.24	.00	.48	9,393.69	7.8
High	457	.21	−.01	.42	3,160.99	6.9
Overall	1,663	.22				

The quality of the tests can be considered as a further index of the quality of the study (Table 6). That is, the tests were coded as high (published and/or norms available in publications), medium (some attempt in the article was made to reference psychometric qualities of the test), or low (no information on the test is provided) in quality. There was no relationship between this dimension of the quality of the test and the effect sizes, which again supports the finding that the quality of the study was not a major moderator.

The Participants

Most studies in the meta-analysis provided limited information about the participants, other than stating that they were management personnel, students, or adults. In the few cases where such background characteristics were recorded, there were no differences relating to ethnic groups (see Bacon, 1988; Wetmore, 1972), socioeconomic status, or academic achievement.

Background of participants. Scherl (1982) found that Outward Bound participants came from a variety of backgrounds, predominantly urban, and were seeking somewhat more than a holiday in that they were looking for an opportunity in which to reassess themselves. Most of the participants were students or managers, although some programs specifically catered to behaviorally disturbed adolescents, psychiatric patients, recovering alcoholics, schizophrenia mood disorder patients, delinquents, and alcohol and drug abuse adolescents (Gass & McPhee, 1990; Golins, 1979; Kelly & Baer, 1968; Sachs & Miller, 1992; Stich, 1983; Wright, 1982). Stich found that psychiatric patients who attended Outward Bound

TABLE 6
Effect sizes and summary information relating to quality of outcome measure

Test quality	No.	Mean	−1.96 SE	+1.96 SE	H_T	Radio
			Program			
Low	84	.37	.12	.63	726.38	8.8
Medium	368	.21	−.11	.54	1,217.06	3.3
High	548	.43	.21	.65	5,907.42	10.8
			Follow-up			
Low	9	.31	−.12	.73	40.31	5.0
Medium	54	.13	−.12	.39	170.33	3.2
High	28	.18	−.01	.37	1,240.76	4.4

had a shorter mean stay in the hospital, and the positive effects on contentment did not dissipate during subsequent treatment.

In our meta-analysis there are no differences in the effect sizes between "normal" participants, managers, and delinquents during adventure programs. The effect sizes for the delinquents in the follow-up studies were greater than for the other two identified groups (Table 7). While the landmark studies in this area (Kelly & Baer, 1968, 1969, 1971; Willman & Chun, 1973) originally illustrated the potential of adventure programs for the redirection and rehabilitation of delinquents, further research in this area by Castellano and Soderstrom (1992) has continued to identify adventure programs as "promising alternatives to traditional justice interventions" despite a paucity of solid empirical evidence that they have significant effects on juvenile recidivism. After taking 30 delinquents on a 30-day wilderness course, they concluded that successful completion of the program (6 did not complete)

> resulted in arrest reductions which began immediately and lasted for about one year....The recidivism reduction benefits of the program appear confined to those participants who successfully completed the program, and extended to reductions in the seriousness of subsequent arrests and adjudications. Notwithstanding positive program effects, seventy-five percent of the youth who successfully completed the program were rearrested. (p. 43)

Recidivism may well be, at least in part, a function of inadequacy of postprogram support. It has been found, for example, that retention and continued growth in gains could be achieved with behaviorally disturbed children, both in behavior adjustment as well as academic adjustment, as a consequence of follow-up work after an adventure program (Rawson, 1973). Our findings in the meta-analysis somewhat replicate the studies of Kelly and Baer, who established long-term positive effects on criminal recidivism following special Outward Bound courses. We were surprised, however, at the lack of studies involving such clients, particularly given the rhetoric about the power of Outward Bound to reduce recidivism.

Age. Few studies in our meta-analysis explicitly assessed the effects of age, and most of those that did found no significant differences (e.g., Parkhurst, 1983;

TABLE 7
Effect sizes and summary information relating to background

Background	No.	Mean	−1.96 SE	+1.96 SE	H_T	Ratio
			Program			
Normal	870	.35	.10	.59	8,323.32	9.0
Delinquent	80	.33	.05	.62	432.41	5.5
Management	50	.35	.02	.69	53.72	1.1
			Follow-up			
Normal	260	.14	−.04	.33	1,198.10	4.6
Delinquent	26	.34	−.05	.74	135.01	5.4
Management	32	.08	−.22	.37	15.21	.5

Wetmore, 1972). Ewert and Heywood (1991) claimed that the younger students (ages 16–21) chose to attend because of the physical challenge, whereas older students (21 and older) attended for a more intimate sense of belonging or as a way to develop new styles of thinking about their changing lives.

There was too little information in most studies in our meta-analysis to be specific about the age of the participants. Some studies provided a range, others a mean, and many a brief description (e.g., university students). The variance shared between the effect sizes and the average age of participants was less than one percent, which indicates that the effects were not moderated by age. We then divided the samples into those that used adults (including university students) and those that used school-based students (Table 8). The effects of the adventure programs were greater for adults (.38) than students (.21), although the means for the follow-up were similar. Where there was information about the adventure programs on students, secondary students had similar effects ($M = .18$) to university students ($M = .21$). A likely moderator of any age effect would be the reasons for participation. For many younger people, participation is decided by their school or parents, whereas most adults participate voluntarily and are therefore likely to be more motivated. Most studies, unfortunately, do not report the motivations for participation.

Gender differences. When first established, adventure programs were largely for males, and the earlier notion of "making men out of boys" still lingers, mainly in poorly informed magazine and newspaper reporting. Recently, 41% of participants in U.S. Outward Bound programs were female (e.g., Miner & Boldt, 1981; Strutt, 1966), and there are adventure organizations now specifically devoted to females (Humberstone & Lynch, 1991). In an only-females program, Strutt assessed the effects on the personality of 86 young females who attended an Outward Bound program against a control group of females (matched on job, age, and personality). Nineteen months after the program, those who had attended were more stable, dependable, critical, lively, and confident, and more of those who had attended had achieved promotion.

Estes and Ewert (1988) suggested that men and women often have different expectations and past histories regarding experiences in the natural environment. They claimed that although the findings were not consistent, males were less group-oriented and placed higher value on autonomy and individual control. In

TABLE 8
Effect sizes and summary information relating to age

Age	No.	Mean	−1.96 SE	+1.96 SE	H_T	Ratio
			Program			
Students	228	.21	−.03	.46	1,002.73	4.4
Adult	772	.38	.13	.64	6,617.60	8.6
			Follow-up			
Students	115	.19	−.09	.47	591.51	5.2
Adult	232	.17	−.01	.35	912.96	4.0

comparison, females indicated a higher level of expectation of group development within their Outward Bound groups and a higher level of group development after the experience. Humberstone and Lynch (1991; Humberstone, 1989) claimed that females are typically reluctant to become physically independent and tend not to want to be involved in organized physical activity. They argued that "most outdoor activities have an image of male appropriateness....Adhering to what appear to be male-generated ways of doing things may add to feelings of irrelevance which some girls may experience within outdoor education" (p. 28).

Most studies that have investigated gender effects have compared differences between males and females attending in mixed groups. There have been fewer studies that have assessed the differences in outcomes between mixed and single-gender groups. Among those studies investigating gender differences in mixed groups, most have found minimal differences between single-gender and mixed-gender courses for either males or females (Burdsal & Force, 1983; Marsh et al., 1986a, 1986b). M. A. W. Smith (1971) claimed that boys gained more from adventure experiences than girls, although the differences were not statistically significant. Richards (1987) reported gains in physical self-concept as a result of Outward Bound programs for adult males and females and for adolescent males, but not for student females. Fraser et al. (1991) found that despite being at the same levels at the beginning of the program, females tended to improve in vigor and personal relations whereas males tended to deteriorate. Bertolami (1981) reported that both males and females increased in self-esteem and in internal locus of control.

In our meta-analysis, single-gender groups had greater mean effect sizes than mixed groups (Table 9). The majority of these single-gender groups were from Australian Outward Bound programs. Hence, the apparently larger effects of single-gender classes was confounded with the larger effect size due to the Australian programs. To pursue this issue, we looked at single-gender and coeducational differences within the Australian studies and found no differences (male-only $M = .50$; female-only $M = .41$; coeducational $M = .48$). It would be of particular interest to contrast the effects from male and females crossed with single-gender and coeducational programs. These data, unfortunately, were not

TABLE 9
Effect sizes and summary information relating to gender composition of the groups

Gender	No.	Mean	−1.96 *SE*	+1.96 *SE*	H_T	Ratio
			Program			
Males only	225	.40	.20	.60	2,132.92	9.5
Females only	153	.41	.13	.70	666.19	4.4
Coed groups	612	.31	.04	.50	5260.14	8.4
			Follow-up			
Males only	173	.21	.04	.37	910.31	5.3
Females only	56	.09	−.20	.38	119.77	2.1
Coed groups	118	.17	−.12	.45	336.21	2.9

available, as it was rare for studies to report the effects for males separately from females within coeducational programs. From the available information, it appears that the effects on males and females are similarly positive.

The Program

The effects of adventure programs are heterogeneous, and thus it is important to more fully investigate the major moderators on these program effects. Although it was often difficult to detect the differences between wilderness and adventure programs, it seems that the former involved more extreme mountain or physical challenges. The wilderness programs have higher follow-up effects, and this is primarily related to the success of these programs with delinquents (Table 10). The effect sizes from the Australian Outward Bound School are substantially greater than for the other adventure programs, although all programs have similar follow-up effects (Table 11). When the program effects of these other adventure programs are further subdivided, the other Australasian adventure programs (i.e., other than Australian Outward Bound) were greater but not substantially greater ($M = .22$) than the United States–based schools ($M = .15$). Though it was the place of origin of the Outward Bound movement, there were too few evaluations of programs in the United Kingdom to include them in this comparison.

Duration. The length of the adventure experience varies considerably from courses of only a few days for special clients such as management training groups to the "standard" 22- to 26-day program (and much longer specific courses). Despite this variability, it is rare to find comparisons in outcomes related to length of the course. Ewert (1982) compared a 9-day program with a 23-day program using participants similar in age and attitude toward Outward Bound. Using the Tennessee Self-Concept Scale, he found no significant differences between the groups, but still claimed that longer participation in Outward Bound yielded greater and more positive change in self-concept.

For studies in our meta-analysis, the median length of the adventure programs was 22 days, with 10% less than 9 days, 13% between 10 and 19 days, and 77%

TABLE 10
Effect sizes and summary information relating to nature of the program

Nature of program	No.	Mean	−1.96 *SE*	+1.96 *SE*	H_T	Ratio
			Program			
Adventure	39	.41	.06	.76	136.96	3.6
Wilderness	38	.37	.07	.67	178.82	4.8
Outward Bound	894	.34	.09	.59	7,931.81	8.9
Sailing ships	29	.34	.11	.58	47.45	1.7
			Follow-up			
Adventure	2	.07	−.06	.21	.19	.2
Wilderness	24	.34	−.07	.74	132.77	5.8
Outward Bound	292	.18	−.01	.37	1,344.96	4.6
Sailing ships	29	.02	−.22	.25	50.63	1.8

TABLE 11
Effect sizes and summary information relating to origin of program

Origin	No.	Mean	−1.96 SE	+1.96 SE	H_T	Ratio
			Program			
Australian OB	584	.47	.23	.71	5,913.59	10.2
Other adventure	416	.17	−.02	.44	1,361.83	3.3
			Follow-up			
Australian OB	176	.17	−.15	.49	514.27	2.9
Other adventure	171	.18	.02	.34	948.32	5.9

greater than 20 days. The effects were greater for programs longer than 20 days, both at the end of the adventure and at follow-up (Table 12). Cason and Gillis (1994) reported similar effects of length. They found a correlation of .17 between the number of hours in the program and effect size. Our results, however, need to be considered in light of the interactions between adults, country of program, and duration. The effects for students were similar regardless of duration or country of origin ($n = 228$, $M = .21$). For adults, the effects of short and medium programs were similar ($n = 190$, $M = .28$), but were more marked for longer programs in Australia (> 20 days, $n = 488$, $M = .51$).

The Outcomes

All outcomes were listed, and the four authors coded them into 40 categories (Table 13). Adventure programs had greatest immediate effects on most dimensions of leadership, academic, independence, assertiveness, emotional stability, social comparison, time management, and flexibility. The lower positive effects were for leadership goals, physical ability self-concept, academic self-concept, femininity, and interpersonal communication. Subsequently, these 40 categories

TABLE 12
Effect sizes and summary information relating to duration of the program

Duration	No.	Mean	−1.96 SE	+1.96 SE	H_T	Radio
			Program			
Less than 9 days	61	.32	−.12	.75	236.25	3.9
10–19 days	129	.26	−.01	.53	208.56	1.6
More than 20 days	810	.36	.12	.60	7,708.62	9.5
			Follow-up			
Less than 9 days	19	.12	−.48	.72	14.86	.8
10–19 days	92	.13	−.14	.40	248.22	2.7
More than 20 days	228	.20	.02	.38	1,171.15	5.2

TABLE 13
Effect sizes and summary information relating to outcome variable

Variable	No.	Mean	−1.96 SE	+1.96 SE	H_T	Ratio
		Program				
Leadership	222	.38	.05	.71	889.14	4.0
Conscientiousness	7	.46	.24	.68	51.11	8.5
Decision making	8	.47	.06	.88	23.22	3.3
Leadership-general	68	.33	.01	.66	271.42	4.1
Leadership-teamwork	49	.42	.11	.74	205.47	4.3
Organizational ability	39	.44	.13	.76	148.45	3.9
Time management	36	.46	.10	.81	122.90	3.5
Values	8	.20	−.05	.45	52.80	7.5
Goals	15	.05	−.64	.75	14.71	1.1
Self-concept	271	.28	.07	.47	2,986.88	11.1
Independence	20	.47	.17	.76	32.70	1.7
Physical ability	18	.08	−.10	.26	100.55	5.9
Peer relations	9	.28	.17	.41	75.70	9.5
General self	43	.28	.11	.46	816.97	19.5
Physical appearance	8	.38	.24	.52	175.54	25.6
Academic	17	.17	.05	.30	133.12	8.3
Confidence	55	.33	.11	.55	627.82	11.6
Self-efficacy	29	.31	.05	.57	191.37	6.8
Family	9	.25	.09	.40	105.62	13.2
Self-understanding	9	.31	.08	.54	60.53	7.6
Well-being	43	.24	−.01	.48	298.92	7.1
Academic	30	.46	.23	.70	278.81	9.6
Academic-direct	7	.50	.19	.82	7.35	1.2
Academic-general	23	.45	.23	.67	158.02	11.7
Personality	235	.37	.10	.65	1,759.45	2.5
Assertiveness	23	.42	.20	.63	357.12	16.2
Reduction in aggression	7	.33	.03	.64	14.87	2.5
Achievement motivation	38	.36	.01	.72	68.40	1.8
Emotional stability	34	.49	.22	.76	241.94	7.3
Femininity	6	.10	−.07	.27	35.80	7.2
Internal locus of control	18	.30	.06	.54	181.62	10.7
Maturity	5	.32	.04	.60	13.35	3.3
Neurosis reduction	33	.31	−.01	.62	160.12	5.0
Masculinity	6	.26	.09	.44	30.29	6.1
Interpersonal	176	.32	−.00	.64	978.58	5.7
Behavior	4	.34	.10	.58	12.70	4.2
Cooperation	24	.34	−.05	.72	61.15	2.7
Interpersonal communication	49	.13	−.26	.53	173.08	3.6
Relating skills	21	.26	−.01	.53	159.05	8.0
Recidivism	3	.55	.31	.88	23.14	11.6
Social competence	74	.43	.14	.73	500.95	6.9
Adventuresome	69	.38	.14	.63	881.33	13.0
Challengeness	35	.39	.13	.66	338.79	.10.0
Flexibility	65	.42	.11	.73	322.97	5.0
Environmental awareness	5	.24	−.14	.62	106.34	26.6
Physical fitness	29	.40	.17	.62	471.57	15.4

TABLE 13 (*continued*)

Variable	No.	Mean	−1.96 SE	+1.96 SE	H_T	Ratio
		Follow up				
Leadership	58	.15	−.17	.48	80.87	1.4
Conscientiousness	2	−.28	−.53	.13	.03	.0
Decision making	2	.64	−.20	1.48	.05	.1
Leadership-general	13	.16	−.16	.48	15.41	1.3
Leadership-teamwork	15	.16	−.18	.50	12.16	.9
Organizational ability	13	.08	−.24	.40	14.48	.1
Time management	13	.21	−.11	.53	19.47	1.6
Values	3	.32	.01	.63	7.02	3.5
Self-concept	149	.23	.08	.38	959.04	6.5
Independence	2	.27	−.57	1.11	0.00	.0
Physical ability	8	.37	.24	.50	24.19	3.5
Peer relations	15	.20	.08	.32	57.52	4.1
General	16	.33	.17	.49	147.73	9.8
Physical appearance	9	.32	.18	.47	89.04	11.1
Academic	34	.30	.17	.43	204.84	6.2
Confidence	26	.14	−.04	.32	69.62	2.8
Self-efficacy	11	.21	−.10	.51	16.66	1.7
Family	11	.10	−.04	.24	25.97	2.6
Self-understanding	10	.16	−.04	.24	42.88	4.8
Well-being	4	−.09	−.28	.11	4.83	1.6
Academic	9	.21	−.07	.51	18.69	2.3
Academic-direct	4	.30	−.06	.66	5.93	2.0
Academic-general	5	.13	−.14	.40	4.22	1.1
Personality	76	.14	−.18	.46	191.11	2.5
Assertiveness	6	.10	−.19	.41	6.17	1.2
Reduction in aggression	3	.72	.27	1.18	3.33	1.7
Achievement motivation	15	.15	−.19	.48	13.34	1.0
Emotional stability	15	.11	−.18	.39	39.46	2.8
Locus of control	3	−.04	−.30	.22	3.91	2.0
Maturity	3	−.01	−.36	.34	29.31	14.7
Neurosis reduction	9	.24	−.16	.64	19.34	2.4
Interpersonal	36	.17	−.16	.50	78.81	2.3
Behavior	2	.01	−.32	.35	0.00	.0
Cooperation	5	.31	−.22	.85	29.17	7.3
Interpersonal communication	1	.10	−.12	.32		
Relating skills	1	.01	−.20	.22		
Recidivism	8	.10	−.25	.44	.50	.10
Social competence	19	.20	−.13	.53	45.84	2.5
Adventuresome	19	−.06	−.32	.19	42.81	2.4
Challengeness	11	.08	−.21	.37	6.56	.7
Flexibility	22	.08	−.24	.40	19.63	.94
Physical fitness	8	−.26	−.48	−.05	28.30	4.0

were coded into 6 more encompassing dimensions (Table 14). These 6 dimensions (academic, leadership, self-concept, personality, interpersonal, and adventuresome) appear to summarize the claimed outcomes from adventure programs, and the effects across these 6 dimensions are systematically high. These effects were maintained over time for all categories but adventuresome.

Leadership. Stoltz (1992) reviewed promotional materials for Outward Bound courses and found that each program explicitly claimed to improve the teamwork, communication, and leadership skills of its participants (see also Miner, 1991). Richards (1975) noted that the public perception of Outward Bound was about leadership, usually in spartan conditions, involving hard physical work, team spirit, and unsophisticated food. Although these aspects can be present, Richards argued that leadership needs to be viewed as the performance of those acts that help the group achieve its goals. "These acts may be termed group functions and so it can be concluded that any member of a group may at some time be the leader if he/she acts in ways that serve group functions" (p. 9). During the Outward Bound programs there are many challenges

> presented which require a coordinated effort and cohesive group spirit to overcome. These include maneuvering rafts down rapids or getting gear across a swollen creek or erecting shelters in the rain. Under these conditions it is important to get support for ideas and strategies in order for the group to achieve its goals while at the same time the stress of the situation and requirement for quick thinking often makes it difficult to do so. (p. 10)

Hence, it is argued, Outward Bound stimulates the development of interpersonal competence, which may be seen as a very fundamental aspect of leadership.

Over most leadership dimensions there were high effects in our meta-analysis, and it can be concluded that most adventure programs impact leadership competencies. Given that many programs aiming to enhance leadership skills involve participants already nominated because they appear to have leadership potential, then these effects are most impressive. The effects on goals are trivial, although it is important to note that the items on typical questionnaires ask about the

TABLE 14
Effect sizes moderated by origin of the program, age, and duration

| | Program | | | | Follow-up | | | |
| | Australian | | Not Australian | | Australian | | Not Australian | |
	No.	M	No.	M	No.	M	No.	M
Students								
Shorter programs	23	.15	42	.17	7	−.29	10	.31
Longer programs	20	.28	143	.23	44	.29	46	.15
Adult								
Shorter programs	73	.30	52	.38	65	.19	29	.02
Longer programs	468	.51	179	.07	60	.10	78	.25

number and nature of goals rather than about the specificity and challenge of goals.

Self-concept. As already noted, self-concept has been one of the major outcomes investigated for adventure programs. Various summaries of research into the effects of adventure programs on self-concept development have been produced to show some justification for suggesting, at least in broad terms, that such programs are effective in this domain (Ewert, 1983; Godfrey, 1974; Hazelworth & Wilson, 1990; Nye, 1976; Pollack, 1976; Richards, 1977; Risk, 1976; Shore, 1977; Stremba, 1977), although there are studies that have found no effect on self-concept (e.g., Cytrynbaum & Ken, 1975; Gillis, 1981; Jernstedt & Johnson, 1983; Jones, 1978; Powers, 1983; Stogner, 1978). Ewert (1989) noted that despite methodological weaknesses, an "overwhelming amount of evidence supported the claim that survival training did positively enhance an individual's self-concept" (p. 13).

In our meta-analysis, the greatest effects of the adventure programs in the self-concept domain were for independence, confidence, self-efficacy, and self-understandings, and they were further enhanced during follow-up periods. These domains are often referred to as a higher-order domain of "presentation of self." The effects on many of the lower-order dimensions (e.g., peers, family) are typically smaller but still high when compared to many other self-concept programs (see Table 4 and Hattie, 1992a).

Parle (1986) demonstrated that Outward Bound programs have positive effects on adolescents' confidence in themselves and their ability to act successfully in a variety of challenging situations (see also Matthai, 1973). However, others have noted that such increases in self-efficacy may not necessarily be generalized. Ewert (1989) argued that while perceived competence at an outdoor pursuit (e.g., rock climbing) may increase self-efficacy, "this feeling does not translate into a feeling of general competence" (p. 56). In our meta-analysis, the effect on self-efficacy is .31 (Table 13); these effects are further enhanced over time.

Scherl (1986) proposed that enhancing self-control or independence may be the mediating effect to enhanced self-concept. Self-control involves controlling the self so as to respond appropriately to environmental contingencies. A wilderness environment is challenging and unpredictable, and thus any person who is interacting with that environment, to be effective, must actively modify his or her behavior. The only effective way to do this, claimed Scherl, was to develop and maintain self-control. Further, the end result must be an active exercise of control, rather than a changed perception of the environment, as the challenges faced invariably involve a concrete task that needs a concrete solution. This argument appears to be supported tangentially by the effects found in the meta-analysis on internal locus of control (.30) and on independence (.47).

The effects of the adventure program on physical ability self-concept are low, although the effects on actual physical fitness are high. On follow-up, however, the effects on the physical ability self-concept measures are very high, and actual physical ability declines. There is a possible frame of reference effect in that during the program the participants realize the reality of the harshness of living in the outdoors and compare themselves with other participants who tend to be self-selected on the basis of fitness, so that there are no effects on physical ability self-concept even though there are gains in fitness and other health related benefits

(Marsh & Peart, 1988). On returning home they realize that the adventure did improve their physical fitness, and they compare themselves to individuals in their immediate frame of reference rather than other program participants, so that physical ability self-concept increases even though actual physical fitness declines.

Academic. A few adventure courses have been specifically designed to produce gains in the cognitive domain, especially in language and mathematics, through an integrated program of remedial teaching, normal schoolwork, and experiences likely to influence personality in general and self-esteem in particular. It is important to note that some adventure programs have specific aims with respect to academic goals, whereas most do not. Thus, when Gillis (1981) stated that, "as expected," a 3-weekend camping trip had no effect on academic achievement, he is referring to an Outward Bound program that made no claims to so change achievement. Marsh and Richards (1988), on the other hand, chose 66 students from among the poorest-achieving students in schools and conducted a number of 6-week residential adventure programs for these ninth graders with the aim of enhancing academic achievement. They found positive effects on academic achievement and self-concept of achievement.

At a more general academic level, Ewert (1989) noted the benefits of an adventure experience for problem solving (see also Marsh et al., 1986b). "The components of problem solving—identifying the problem, identifying and reviewing solutions, picking and implementing a solution, and evaluating the solution—lend themselves particularly well to an outdoor adventure situation" (p. 53). These problems also are time critical, involve communication and cooperation, and have immediate feedback (see also Royce, 1987). Other researchers have also demonstrated that adventure programs may be helpful in motivating students to improve their academic performances (Gass, 1987; Gillenson, 1983; Hammerman, 1978; Stogner, 1978).

The effects on academic performance—both general academic gains such as problem solving and direct effects such as mathematics scores—are most impressive. The direct effects should not be generalized to all adventure programs, as most of them (see Table 13) are from programs where the aim is to improve academic skills (e.g., Marsh & Richards, 1988). The effects of general academic competencies, however, come from many programs, and thus it can be claimed that adventure programs enhance general problem solving competencies (although there is much variance in these effects).

Personality. There have been many claims that the effects of adventure programs are marked on personal attributes such as gender identity, achievement motivation, emotional stability, and assertiveness and in the reduction of various neuroses (such as anxiety). Drebing, Willis, and Genet (1987) found that students with higher or lower levels of anxiety found it harder to understand their experience compared with those students with a moderate level of anxiety. "Students with very low levels of anxiety may not be motivated towards understanding and those with very high anxiety are more distracted with coping with the stress and less able to attend to the learning process" (p. 20). Further, those students with the highest anxiety reported having a more significant relationship with the leaders, and leaders reported most satisfying relationships with high-anxiety participants.

For our meta-analysis, effects on personality dimensions are high for assertiveness

as well as in the reduction of aggression, for emotional stability, achievement motivation, internal locus of control, maturity, and reduction in neurosis. For most of these personality attributes there was minimal enhancement during the follow-up period. The effects on masculinity were larger than the effects of femininity, but it is important to note that both effects are positive. This positiveness is consistent with the notion that masculinity and femininity are not bipolar mea-sures and that adventure programs can have an androgynous influence. As Marsh and Richards (1989) also demonstrated, these effects on masculinity and feminin-ity were consistently observed with both males and females on a variety of different measures of masculinity and femininity.

Interpersonal. When participants were asked to rate the importance of out-comes of adventure programs, Shafer and Mietz (1969) found that social and interpersonal concerns were of minor importance and received the lowest possible ranking (see also Brown & Haas, 1980; Rossman & Ulehla, 1977). Given the unique setting of adventure programs, a common aim has been the development of interpersonal skills, usually by forming small groups and making these groups face a set of increasingly more challenging tasks that necessitate group interac-tions to achieve goals with real consequences (such as climbing a mountain or negotiating a set of whitewater rapids). In our meta-analysis, across all interper-sonal dimensions, there are marked increases as a consequence of the adventure programs. This is particularly noted with social competence, cooperation, and interpersonal communication. It certainly appears that adventure programs affect the social skills of participants in desirable ways.

Adventuresome. A key component of adventure programs that distinguishes them from most other education programs is the involvement of adventure. Abbott (1989) claimed that "trips need to be exciting with some 'adrenaline' buzzes, and have a level of difficulty that the participants feel drawn to pit themselves against" (p. 164; see also Wright, 1982). In our meta-analysis, the effects on challenge and flexibility are very high (.39 and .42, respectively).

Overall Comments on Outcomes

A variety of procedures were used to determine the major influences on the outcomes of adventure programs. Setwise regression, based on procedures out-lined in Hedges and Olkin (1985), was used with the sets defined as program effects, background effects, outcome effects, and study effects. Across all vari-ables (most recoded as dummy variables), a total of 36% of the variance in the effect sizes was explained. The major source of variance related to the *set* of program effects—that is, the type of adventure program (Outward Bound versus other forms of adventure programs), the duration (> 20 days), and whether the program was Australian Outward Bound or not. These variables accounted for 20% of the variance, or 55% of the explained variance. The next major source related to the background of the participants (i.e., academic background, socio-economic status, and adult or student). The six overall categories of outcomes explained the next largest source of variance. The least amount of variance was explained by the study variables—that is, publication source, quality of test, and quality of study.

The three *individual* variables that explained the most variance were age (adult or student), length of program (divided into only two categories: longer, which

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meant 20 days or more, and shorter, which meant fewer than 20 days), and whether the adventure program was Australian Outward Bound or not. Table 14 presents the means from the interactions for these three variables. Longer rather than shorter programs had the greatest effects, programs with adults were more effective than those with nonadults, and Australian programs had greater effects than non-Australian programs. More importantly, there was a marked interaction effect in that longer, adult, Australian programs were most effective of all, whereas longer, adult, non-Australian programs were the least effective of all.

Conclusions

This meta-analysis has demonstrated that some aspects of adventure programs are most successful, whereas other aspects are not effective and are in much need of improvement. In the most general terms, the average effects from attending adventure programs of .34 is not too dissimilar to the effects of many innovations in classrooms. The effects of adventure programs on self-esteem (.26) exceeds that of other educational programs (.19). The overall result is very similar to the .31 reported by Cason and Gillis (1994) in their meta-analysis based solely on adolescents. This overall picture appears comforting. The details, however, reveal a different picture. Only some adventure programs are effective, and then on only some outcomes, and it is probable that only parts of the programs are influencing these outcomes. The most effective programs were for adults in the Australian Outward Bound, longer (20+ day) courses (.51), and the least effective programs were for adults in non-Australian, longer programs (.07). For all programs with school-aged students and for all shorter programs, the mean effect was .26.

While the overall effects of adventure programs on the outcome measures are at least equivalent to those of other educational programs, the continued gains and longevity of the follow-up effects are the most impressive findings. A program effect of .34 and a follow-up of an additional .17, leading to a combined pre-follow-up effect of .51, are unique in the education literature. This alone provides much justification for adventure programs, although the caveats noted above about which aspects of which programs are effective need to be heeded. It seems that adventure programs have a major impact on the lives of participants, and this impact is lasting.

The major benefits for adventure programs are reasonably consistent across all six major categories of outcomes. A theme underlying the outcomes with the greatest effects relate to self-control. These include independence (.47), confidence (.33), self-efficacy (.31), self-understanding (.34), assertiveness (.42), internal locus of control (.30), and decision making (.47). These outcomes relate to a sense of control over or regulation of the self, responsibility, or an assurance of self. Most of these effects are maintained over time. Thus, adventure programs appear to be most effective at providing participants with a sense of self-regulation. The effects on most leadership, personality, and adventuresome dimensions are also substantial, but increase less substantially over time.

Many of the studies have investigated the effects on specific dimensions of self-concept and then made sweeping claims that these specific dimensions lead to changes in "general" self-concept. Our view of self-concept, however, is becoming more refined, and major advances have been made in understanding the multidimensional nature of self-concept and the complexities of how individuals

integrate specific conceptions about the self into a "general" self-concept (Hattie, 1992a; Marsh, 1992; Marsh, Byrne, & Shavelson, 1992; Marsh & Hattie, 1996). Self-concept is a multidimensional notion and primarily involves cognitive processing. Our self-concepts or conceptions of our self are cognitive appraisals, expressed in terms of descriptions, expectations, and/or prescriptions, integrated across various dimensions that we attribute to ourselves (Hattie, 1992a). Many individuals place salient values on these conceptions such that they are related in a hierarchical manner to form higher-order self-concepts (Shavelson, Hubner, & Stanton, 1976). The lower-order dimensions can include achievement, ability and classroom self-concepts (which form a second-order dimension of academic self-concept), peer and family self-concepts (which form a social self-concept), and confidence and physical appearance self-concepts (which form a presentation self-concept). Too often, studies in the adventure literature have confused specific lower-order dimensions with higher-level concepts, and most have ignored the mechanisms used by participants to integrate the conceptions of self into higher-order notions.

The effects on the various dimensions of self-concept cluster around .20, and these improve over time. Marsh (in press) has emphasized the important role of physical self-concept in facilitating physical activity and health-related physical activity. Hence, the juxtaposition between physical self-concept and physical fitness is particularly surprising in this meta-analysis. There are only small short-term gains in physical ability self-concept (.08), even though there are substantial gains in physical fitness (.40). In contrast, the short-term gains in physical fitness are partly eroded by the time of the follow-up assessments (−.26), whereas there are substantial additional gains in physical self-concept between the end of the program and the follow-up assessments (.37). This apparent "sleeper" effect for physical self-concept may reflect frame of reference effects at the end of programs (i.e., comparisons with other participants who are likely to be self-selected in terms of physical fitness and in comparison with the challenging physical demands of the immediate environment) that are altered when participants return to their normal environments. Marsh and Peart (1988), for example, showed that whereas both physical fitness and physical self-concept improved due to a cooperatively oriented aerobics program, a competitively oriented program led to an increase in physical fitness and a decline in physical self-concept. However, because physical fitness and physical self-concept are typically not assessed in the same studies, there is need for further research on these important outcome variables. Effects on physical self-concept may also reflect problems in the measures that are used. Physical self-concept is typically inferred from responses to global physical scales that may confound distinguishable physical components reflecting, for example, health, physical attractiveness, body composition, fitness, strength, and physical activity (Marsh, in press; Marsh & Richards, 1988; Marsh, Richards, Johnson, Roche, & Tremayne, 1994; see also Fox & Corbin, 1989).

Future Research Directions

Fifty years on, the research on adventure education is ready to come out of its infancy, and we hope that this study can provide an impetus for future research studies. There is a need to move towards evaluating multiple outcomes and investigating the relation between program characteristics and outcomes. We

suspect that there is untapped information in the archives of adventure schools and that it would be valuable for this data to be analyzed and used to improve adventure programs. Given the emphasis, particularly in the United States, on marketing adventure programs, this is, at the very least, a motivation for demonstrating the outcome effects and accountability of adventure programs. On the other hand, adventure program practitioners may be wary of poor publicity, given that the published and available studies appear to not be supportive of the U.S. programs. The belief that adventure programs work is clarified by the results of this study: Only some programs work, and these with only some participants and some instructors, and probably only parts of the program are influencing outcomes.

Our recommendations for future successful research evaluations of adventure programs follow.

(1) Use dependable measurements. The present study demonstrated that there were indications that the highest-quality tests had the greatest effects.

(2) Ensure that there are reasonable sample sizes to obtain a power of at least .80.

(3) Ensure that the tests used are related to the desired outcomes, and, preferably, include scales unrelated to expected outcomes to act as a type of control. Although we have reported that the outcomes were reasonably large across most of the 40 dimensions, it is possible that this is caused by the Hawthorne effect. On one hand this is not a major criticism, as any educational program that can achieve such high effects is probably worthwhile, even if the cause is primarily the Hawthorne effect. On the other hand, it is desirable that the increases in the dimensions are a function of a deliberately planned program. We were not able to determine which outcomes were more or less relevant to the programs in our meta-analysis, and we recommend that this should be a part of future designs of individual studies.

(4) Provide clear documentation and analyses relating to appropriate background variables. In most studies in this meta-analysis, the backgrounds of participants were not described. It may have been that the ethnicity, gender, and nature of the participants and their reasons for attending were key moderator variables (although see Wetmore, 1972, and Bacon, 1988, who found no differences relating to race). In only one study were the motivations for attending reported, and it is probable that most participants were volunteers, which may have led to a heightened expectation of change. Those who are encouraged to attend as part of management training or school-related activities may have differing perceptions and outcomes compared to those who actively choose to attend (e.g., Gibson, 1981).

(5) Ascertain the effects of the instructor. There were few studies that investigated this effect, and given that much of the classroom-based research has demonstrated the powerful influences of the teacher, the effects of adventure instructors is worthy of controlling in future studies (see Marsh et al., 1986a, 1986b). Ewert (1989) summarized the research that has aimed to identify the competencies required of adventure program leaders; the list included judgment, outdoor skills, decision making, and group management. Bartley (1989) claimed that instructor leadership style was not significantly associated with course outcomes, whereas Riggins (1985) found that the most highly evaluated were those

leaders with more course experience, less experience as participants, older, and from larger families. There appears to be a preference to hire leaders who are male; who have traveled extensively on their own; who have competencies in first aid, rescue techniques, and lifesaving; and who have experience as program participants (Buell, 1981; Counsineau, 1977; Green, 1982; Hendy, 1975; Schulte, 1975; Wells, 1978). During the period 1974–1996, the Australian Outward Bound School had a policy of appointing only instructors who were university graduates, and particularly those who were qualified teachers, whereas North American Outward Bound schools have tended to appoint experienced adventurers regardless of academic or teaching background. It is not clear whether these are attributes of people attracted to a vocation in the outdoors or specific to adventure program instructors; most studies merely list rather than evaluate sets of desirable attributes. This is among the most underresearched and critical areas for future study.

(6) Investigate interaction effects between the major variables. For example, this meta-analysis has demonstrated that there are major interaction effects between age of participants, length of program, and country of program.

(7) Ensure that the nature of the program is well documented. A major weakness of many past studies, including many of those in this meta-analysis, is that it is not clear what attributes of the programs were being evaluated. Although there is a rhetoric that the adventure program is a gestalt and that the whole is therefore more than the sum of the parts, this is a testable hypothesis. It may be that the positive effects of the program are a function of particular part(s) of the program.

(8) Consider alternative designs. The pretest-posttest study, which dominates the literature, is not unreasonable, but alternative designs could provide alternative sources of control against plausible rival hypotheses. Alternative designs could include time-series designs, quasi- or true-experimental designs, and qualitative or grounded research designs.

Meta-Analysis as an Evaluation Procedure

An aim of this article has been to demonstrate the value of meta-analysis as an aid to investigating effects of personal change programs. An example that demonstrates these advantages is found at the Australian Outward Bound School, where every instructor is evaluated by participants, co-leaders, and supervisors after every standard course. The average effect size from these evaluations is compared to the average program effects (given the nature of participants, length of course, etc.), and discussion ensues among the instructors and their supervisors as to possible reasons for outlier effects, areas for improvement, and effects of particular parts of the program. The overall average for Australian Outward Bound programs of .47 is a high standard in education, and, while it is not required for every program, the major interest lies both in the moderators that affect this overall finding and suggestions for improving beyond the average. In the case of long courses, a benchmark effect size for land and tall-ship programs has been set at .70. For the 2 years since the introduction of this internal benchmarking, the averages for these courses have been .73 and .81, respectively (Richards & Neill, 1996). The aim of the Australian Outward Bound program is to be instructor proof, and high and consistent effect sizes have been reported across 27 distinct groups led by different instructors in different physical locations at different times

of the year with different types of participants (Marsh et al., 1986a, 1986b). Using effect sizes as benchmarks can highlight the importance of outcomes and can provide a perspective from which improvements to courses can be referenced. By collecting the effect sizes over many courses and across many years, it was possible to gain a greater perspective about what works and what can be improved within this particular program.

The Need to Move From Outcomes to Theory and Process Studies

Most of the studies, and this meta-analysis, have concentrated on the summative rather than formative or process aspects of adventure programs. It is critical that such formative studies are part of research programs that investigate theoretical concerns and processes that lead to the positive changes. We would suggest, for example, that there are four premises relating to how adventure programs positively effect participants, and these could form the basis of future research.

First, adventure programs emphasize an immediate quality of experience, as well as aiming to have these immediate experiences impact later experiences (for elaboration of this argument, see Richards, 1977). There is a planned transfer of experience and decisions encountered during the earlier parts of the course to critical decisions later in the program, and these links are appraised and appreciated by the participants in the here and now. There are few experiences in other educational programs that have as much potential to duplicate the quality and immediacy of experiences that occur during an adventure program. Within traditional schools, for example, students are often asked to work cooperatively in a group, but they rarely have to live with the consequences of their decisions (Royce, 1987). In adventure programs the separation from everyday routine highlights the intensity of the immediate experience and allows the participant full involvement in the activity (Gunter, 1987).

Second, adventure programs set difficult and specific goals and structure tasks so that participants can attain these goals. They provide challenging and specific goals (e.g., successfully negotiating a 60-foot cliff by abseiling, or rappelling) and then structure situations (e.g., adequate preparation, social support) so that participants can reach these goals. If instructors can encourage participants to share commitment to these challenging goals, and if the instructors provide appropriate feedback, then the goals are more likely to be attained. There have been two major types of studies investigating goals. In the first type, participants are asked whether they can articulate goals and then assess the effects of the adventure program on the number and the nature of the goals. As noted above, the effects of these have been minimal. In the second type, the specificity and challenge of the goals have been investigated, and the effects of adventure programs on these have been substantial. Krane, Hattie, and Houghton (in press), for example, asked stake holders on a sailing ship adventure for their goals and found that intrapersonal and interpersonal goals were most frequently set for the voyage by participants, regular ship crew, watch leaders (trainers), sponsors, and management board staff. The goals set at the outset by the watch leaders and participants were more specific than those set by the other stake holders. The more successful participants on the outcome measures were more likely to change their goals to become even more specific and challenging as the voyage progressed. The more goals that the trainees and the other stake holders (in particular their watch leader) had and

shared, the higher their level of success as measured by the perceived trainee success scale.

Third, adventure programs increase the amount and quality of feedback that is vital to the experiential learning process. A major function of challenging and specific goals is that they direct attention and effort, and thus the participant is more aware and keen for feedback related to attaining these goals. Thus, feedback and goals are part of the same equation. Richards (1976) argued that

> one of the fundamental requirements for the development of a person's self-awareness is to receive feedback from others as to how they see his or her behaviors. This does not happen frequently in everyday life, and it is not easy to find situations in life in which there is enough trust, acceptance and concern that feedback can be given and received in maximally effective ways. This situation is consciously worked at in Outward Bound programs. (p. 11)

Feedback is the most powerful single moderator that improves affective *and* achievement outcomes. In a synthesis of over 300 meta-analyses of interventions in educational situations, the most powerful effect was related to feedback (effect size = .91; Hattie, 1987, 1992a, 1993). Adventure programs increase the opportunities for giving feedback, as there is more potential to give feedback when the goals are difficult, where class sizes are small, when there is cooperative planning and peer tutoring, and when there is challenging problem solving. In addition, the environment and outdoor activities are naturally structured to provide feedback; for instance, if a backpack is not packed properly, it is uncomfortable, and if appropriate knots are used for tentage, then a warm, dry sleep can ensue.

The fourth major causal process relates to the reassessment of the individual's coping strategies. As adventure experiences take place in different and often unfamiliar environments, there is much reassessment of the strategies used by participants to cope with and understand their world and their conceptions of self. Many of the strategies previously used to explain and cope with the world no longer work. Our ability to discount our own competence and efficacy, for example, is of little use if we are to cope and survive the day. Our comparisons with other people change as we experience the need to cooperate with them rather than judge, dismiss, or compete with them. Our goals become more specific and challenging, and thus we receive much feedback about progress towards those goals. Finally, we associate with others who appear to be coping with the adventure experience. Thus, for many, there is ample opportunity to replace their coping strategies with newer, more functional and positive strategies (see Hattie & Marsh, 1996; Neill, 1994).

It would be desirable if our meta-analysis could address these four conjectures, but there was insufficient information in the reviewed studies to fully explore them. At least, the conjectures provide the basis for a possible model to explain the process of the adventure experience and can serve as future research directions. There is a dearth of competing models, as most evaluators have merely described adventure programs and have assumed that there are common understandings of the processes across programs. Ewert (1989) suggested that there were many psychological theories that could form the basis of models for explaining the adventure experience (e.g., optimal arousal, competence-effectance, self-efficacy,

attribution, expectancy, and reasoned action), although he preferred a model that identified predisposing factors (e.g., personality, propensity for risk seeking), beliefs about activity (e.g., perception of risk), attitude toward activity (e.g., belief strength), intentions to perform desired behavior (e.g., extent of participation), and behaviors with respect to outdoor adventure activities (e.g., engagement). Others have been more specific but presented models with little or no evidence. For example, Rhoades (1972) proposed a three-step model involving the "unfreezing" of certain attitudes at the outset of the adventure, change through cognitive redefinition during the adventure, and "refreezing" of these changes as a result of acceptance and reinforcement for these changes nearer the end of the program. Priest (1993; see also Priest & Gass, 1993) devised a model based on the learning that participants experience about competence through adventure, and on the impact that successful modeling by others and the effects that personal ego may have on perceptions of risk. Most researchers have merely listed components of successful adventure experiences, and such lists have included the necessity of a wilderness environment (Golins, 1979); a primary peer group (Walsh & Golins, 1976); problem solving (Golins, 1979); a humanistic style of instruction (Hendy, 1975); and challenge, mastery, and reflection (Walsh & Golins, 1976).

An alternative theoretical perspective could be to build a model based on methods for enhancing the strengths of the adventure experience. Given that adventure programs typically take place in outdoor settings and that the highest ranking of importance for participants is the enjoyment of nature (Brown & Haas, 1980; Rossman & Ulehla, 1977; Shafer & Mietz, 1969), it may be that a model based on enhancing environmental concerns and relationship with nature could be valuable in explaining the substantial changes that can result from adventure programs. While participants expect physical challenges, this outcome was far less important to them than enjoying the beauties of nature in the wilderness. Wilderness environments could be considered "restorative environments" (S. Kaplan & Talbot, 1983), as they involve being away from typical surroundings, the natural is dominant, there are opportunities for fascination, learning occurs in a set of regularities within the environment that leads to coherence, there is a compatibility between the environment and the inclinations of many others around the participant, and there is a relative absence of demands on one's behavior that is artificially generated or human imposed. Thus, the natural environment may serve to heighten those aspects which lead to learning and other outcomes, and it maybe that these elements of the wilderness environment are replicable in other contexts (such as in inner cities, on sailing ships, and in classrooms). The effect sizes relating to environmental awareness are very low, and clearly the adventure programs have not capitalized on the uniqueness of their environment.

A further area of investigation that could inform research and offer insights on the interactions between environmental and personal aspects of adventure programs relates to the literature of expeditions, particularly in extreme environmental conditions such as in the Antarctic and at high altitude (McCormick, Taylor, Rivolier, & Cazes, 1985; Watts, Webster, Morley, & Cohen, 1992).

Concluding Comments

Outdoor, experiential, adventure-based education is not new. It can be traced back at least to Plato, although it has had a 20th-century rebirth largely through the

influence of notable educators such as Kurt Hahn. Outward Bound, which figures significantly in this rebirth, provides a useful example of many of the characteristics and results of this field, and the Australian Outward Bound School, with a strong tradition of evaluative research, provides a particular and more specific example.

Early evaluations of adventure programs relied more on statements of faith than anything else, although by the 1970s there was a growing awareness that the significant outcomes that had been claimed in the 1960s were not coming simply through men meeting the mountains, but through some variety of moderating factors such as self-concept. This led to a more determined search for the moderating or process variables involved in, as well as the outcomes from, adventure programs. However, methodologies have ranged in quality, and even the outcomes range from the dubious to the extravagant. The present study employed meta-analysis as a way of assessing effects across programs and so was able to achieve valuable analyses of adventure programs while avoiding the usual methodological problems of small samples, few outcome measures, and low statistical power. The meta-analysis estimated 1,728 effect sizes from 12,057 unique participants attending a wide range of activities covering a period of over a quarter of a century.

Overall, the results suggest that adventure programs can obtain notable outcomes and have particularly strong, lasting effects. It is clear, however, that adventure programs are not inherently good. There is a great deal of variability in outcomes between different studies, different programs, and different individuals. There is much evidence that some programs are effective, and a major aim of this article has been to suggest key instructional factors that may lead to this effectiveness. Further, we have aimed to provide a recommended methodology that overcomes many of the usual problems of research in this area, such as small sample sizes and varying outcome measures.

Finally, a major claim underlying the discussion is that research on adventure programs can provide many insights which might inform "regular" educational contexts. Adventure programs have been conducted as if they operated in isolation from the educational world. There is little incorporation of research on group dynamics, attitude change, educational theory, and cognitive processes. For example, we found little evidence of the nature of cognitive changes that participants experience as they reconcile their conceptions of their selves, the adaptability of their prior coping strategies, and their cognitions as they confront the risks and adventures before, during, and after the program.

That a 20- to 26-day adventure program can have such substantial effects relative to other educational experiences, and that the effects are long lasting and often increase over time, is a most remarkable aspect of adventure programs and clearly deserves more attention. The overall effects of the adventure programs is most comparable to typical in-class educational interventions on achievement, and often far exceed the affective outcomes. It is most likely the instructional processes that make the difference to outcomes in adventure programs (such as challenge, risk taking, feedback, mutual group support) are similar in regular classrooms. The teachers of in-class educational experiences may learn much from noting the effectiveness of these factors in out-of-class experiences such as adventure programs. The teachers of adventure programs, however, have all too

rarely used the research from their in-class counterparts to improve their programs, and they need to more fully appreciate that they are conducting an educational experience.

The insights provided by this meta-analysis can assist in promoting an awareness that sound evaluative research is among the most promising routes to finding answers to the key questions about the processes that are most successful in adventure programs. The questions that need to be asked by the adventure education promoters and the research procedures which need to be adopted are not dissimilar to those which the broader education scene has now been grappling with for some decades. The promise is there; it is now time for adventure educators to meet the challenge.

References

References marked with asterisks indicate studies included in the meta-analysis.

Abbott, C. (1989). Does outdoor education really work?: Perks, research and reality. *Adventure Education and Outdoor Leadership, 4*, 60–67.

Arnold, P. J. (1970). Physical education, creativity and self-concept. *Bulletin of Physical Education, 8*, 23–25.

*Bacon, S. (1987). *The career beginnings Outward Bound component: An empirical evaluation*. Greenwich, CT: Outward Bound USA. (ERIC Document Reproduction Service No. ED 295 780)

*Bacon, S. (1988). *Outward Bound and troubled youth*. Greenwich, CT: Outward Bound USA.

Bartley, N. L. (1989, November). *Outward Bound leadership model: An exploratory study of leadership variables*. Paper presented at the National Conference on Outdoor Recreation, Fort Collins, CO.

*Bauer, F. (1982). *Papakura probation: Outdoor pursuits courses 1980: One year follow-up*. Auckland, New Zealand: Justice Department.

Bertolami, C. (1981, November). *Effects of a wilderness program on self-esteem and locus of control orientations of young adults*. Paper presented at the Annual Canadian Conference on the Applications of Curriculum Research, Winnipeg, Manitoba, Canada. (ERIC Document Reproduction Service No. ED 266 928)

*Bronson, J., Gibson, S., Kichar, R., & Priest, S. (1992). Evaluation of team development in a corporate adventure training program. *The Journal of Experiential Education, 15*, 50–53.

Brown, P. J., & Haas, G. E. (1980). Wilderness recreation experiences: The Rawah case. *Journal of Leisure Research, 12*, 229–240.

Buell, L. H. (1981). *The identification of outdoor adventure leadership competencies for entry-level and experienced legal personnel*. Unpublished doctoral dissertation, University of Massachusetts. (University Microfilms No. 81-17975)

*Burdsal, C., & Force, R. C. (1983). An examination of counselor ratings of behavior problem youth in an early stage, community-based intervention program. *Journal of Clinical Psychology, 39*, 353–360.

*Campbell, W., Rily, D., & Easthope, T. (1981). *Recidivism following involvement in an outdoor expeditionary project*. Christchurch, New Zealand: Probation Service, Justice Department.

Cason, D., & Gillis, H. L. (1994). A meta-analysis of outdoor adventure programming with adolescents. *The Journal of Experiential Education, 17*, 40–47.

Castellano, T. C., & Soderstrom, I. R. (1992). Therapeutic wilderness programs and juvenile recidivism: A program evaluation. *Journal of Offender Rehabilitation, 17*, 19–46.

*Chenery, M. F. (1981). Effects of summer camp on child development and contributions of counselors to those effects. *Journal of Leisure Research, 13*, 195–206.

*Collingwood, T. R. (1972). *Survival camping: A therapeutic mode for rehabilitating problem youths* (Tech. rep.). Little Rock: Arkansas Rehabilitation and Research Training Center.

Counsineau, C. (1977). *A Delphi consensus on the set of principles or the development of a certification system for educators in outdoor adventures*. Unpublished doctoral dissertation, University of Northern Colorado.

*Cytrynbaum, S., & Ken, K. (1975). *The Connecticut wilderness program: A preliminary evaluation report*. Report submitted to the State of Connecticut Council on Human Services, Hartford, CT.

Doyle, W. E. (1981). An outdoor-challenge experience and the effective development of college students (Doctoral dissertation, University of Massachusetts, 1981). *Dissertation Abstracts International, 42*(3), 1022A–1023A.

*Drebing, C. E., Willis, S. C., & Genet, B. (1987). Anxiety and the Outward Bound process. *Journal of Experiential Education, 10*, 17–21.

Estes, C., & Ewert, A. (1988). Enhancing mixed-gender programming: Considerations for experiential educators. *The Bradford Papers Annual, 3*, 34–43.

Ewert, A. (1982). The effect of course length on the reported self-concepts of selected Outward Bound participants (Doctoral dissertation, University of Oregon). *Dissertation Abstracts International, 43*, 3111A.

Ewert, A. (1983). *Outdoor adventure and self-concept: A research analysis*. Eugene: University of Oregon, Center of Leisure Studies.

Ewert, A. (1989). *Outdoor adventure pursuits: Foundations, models, and theories*. Columbus, OH: Publishing Horizons.

Ewert, A., & Heywood, J. (1991). Group development in the natural environment: Expectations, outcomes and techniques. *Environment and Behavior, 23*, 592–615.

*Felstead, B. (1987). *The outdoor experience program and adolescent offender self-concept*. Canberra: Outward Bound Australia.

Fletcher, B. A. (1970). *Students of Outward Bound schools in Great Britain: A follow-up study*. Bristol, England: University of Bristol, School of Education.

Fletcher, B. A. (1971). *The challenge of Outward Bound*. London: William Heinemann.

Fox, K. R., & Corbin, C. B. (1989). The physical self-perception profile: Development and preliminary validation. *Journal of Sport and Exercise Psychology, 11*, 408–430.

*Fry, S. K. (1993). *Analysis of Australian Outward Bound standard program effects on positive and negative affect*. Canberra: Australian Outward Bound Foundation.

*Gass, M. A. (1987). The effects of a wilderness orientation program on college students. *Journal of Experiential Education, 10*(2), 30–33.

*Gass, M. A. (1990). The longitudinal effects of an adventure orientation program on the retention of students. *Journal of College Student Development, 31*, 33–38.

*Gass, M. A., & McPhee, P. J. (1990). Emerging for recovery: Descriptive analysis of adventure therapy for substance abusers. *Journal of Experiential Education, 13*, 29–35.

*Gibson, P. (1979). Therapeutic aspects of wilderness programs: A comprehensive literature review. *Therapeutic Recreation Journal, 13*, 21–33.

Gibson, P. (1981). The effects of and the correlates of success in a wilderness therapy program for problem youths (Doctoral dissertation, Columbia University, 1981). *Dissertation Abstracts International, 42*, 140A.

Gillenson, A. J. (1983). *Short term experiential laboratories in academic courses*. Unpublished technical report, Dartmouth College, Hanover, NH. (ERIC Document Reproduction Service No. ED 238 624)

*Gillett, D. P., Thomas, G. P., Skok, R. L., & McLaughlin, T. F. (1991). The effects

of wilderness camping and hiking on the self-concept and the environmental attitudes and knowledge of twelfth graders. *Journal of Environmental Education, 21*, 33–44.

*Gillette, J. H. (1971). A study of attitude changes as a result of Outward Bound Maintain Ski Skills, C-60 (Doctoral dissertation, University of Northern Colorado). *Dissertation Abstracts International, 32*, 3785A.

*Gillis, H. L. (1981). *The effects of camping/construction experience on the self-concepts, locus of control, and academic achievement of high school students.* Unpublished master's thesis, Middle Tennessee State University.

Glass, G. V., McGaw, B., & Smith, M. L. (1981). *Meta-analysis in social research.* Beverly Hills, CA: Sage.

Godfrey, R. (1974, April). *A review of research and evaluation literature on Outward Bound and related educational programs.* Paper presented at the Conference on Experiential Education, Estes Park, CO.

*Goldman, K., & Priest, S. (1991). Risk taking transfer in development training. *Adventure Education, 8*, 58–59.

Golins, G. (1979). *Utilizing adventure education to rehabilitate juvenile delinquents.* Denver, CO: Colorado Outward Bound.

*Gouvernet, P. J. (1988). *Motivation and self-regulation.* Unpublished master's thesis, University of Sydney, Australia.

Green, P. (1982, March). *The content of a college-level outdoor leadership course.* Paper presented at the Conference of the Northwest District Association for the American Alliance for Health, Physical Education, Recreation and Dance, Spokane, WA.

Gunter, B. G. (1987). The leisure experience: Selected properties. *Journal of Leisure Research, 19*, 125–130.

Hahn, K. (1957). *Outward bound.* New York: World Books.

Hammerman, D. (1978). Outdoor education. *Journal of Physical Education and Recreation, 1*, 28.

Hattie, J. A. (1987). Identifying the salient facets of a model of student learning: A synthesis of meta-analyses. *International Journal of Educational Research, 11*, 187–212.

Hattie, J. A. (1992a). *Self-concept.* Hillsdale, NJ: Erlbaum.

Hattie, J. A. (1992b). Towards a model of schooling: A synthesis of meta-analyses. *Australian Journal of Education, 36*, 5–13.

Hattie, J. A. (1993). Measuring the effects of schooling. *SET, 2*, 1–4.

Hattie, J. A., & Marsh, H. W. (1996). Future research in self-concepts. In B. Bracken (Ed.), *Handbook on self-concept* (pp. 421–462). Hillsdale, NJ: Erlbaum.

*Hazelworth, M. S., & Wilson, B. E. (1990). The effects of an outdoor adventure camp experience on self-concept. *Journal of Environmental Education, 21*, 33–37.

Hedges, L. V., & Olkin, I. (1985). *Statistical methods for meta-analysis.* New York: Academic.

Hendee, J., & Roggenbuck, J. (1984, August). *Wilderness-related education as a factor increasing demand for wilderness.* Paper presented at the International Forest Congress Convention, Quebec City, Canada.

*Hendy, C. M. (1975). Outward Bound and personality: 16 PF profiles of instructors and ipsative changes in male and female students 16–19 years of age (Doctoral dissertation, University of Oregon). *Dissertation Abstracts International, 36*, 4352A.

*Hileman, M. A. (1979). *An evaluation of an environmental stress challenge programme on social attitudes and recidivism behavior of male delinquent youth.* Unpublished doctoral dissertation, Southern Illinois University.

Hogan, J. M. (1968). *Impelled into experiences: The story of the Outward Bound schools.* London: Educational Productions.

Huie, J. C. (1983). A semester Outward Bound course: An exploratory study of effects on locus of control, values, and life meanings. *Dissertation Abstracts International, 44*, 1372A.

Humberstone, B. (1989). Macho or multifarious: The image and place of outdoor and adventure education in the school curriculum. *British Journal of Physical Education, 20*, 112–114.

Humberstone, B., & Lynch, P. (1991). Girls' concepts of themselves and their experiences in outdoor education programmes. *Adventure Education and Outdoor Leadership, 8*, 27–31.

James, D. (1957). *Outward Bound.* London: Routledge and Kegan Paul.

James, W. (1967). *The writings of William James: A comprehensive edition.* New York: Random House.

Jernstedt, B. C., & Johnson, B. T. (1983). *The effects of long term experiential programs on their participation* (Tech. rep.). Hanover, NH: Dartmouth College. (ERIC Document Reproduction Service No. ED 238 625)

Jones, C. A. (1978). An evaluation of the effects of an Outward Bound type of program upon the self-concepts and academic achievement of high school students (Doctoral dissertation, Boston University School of Education). *Dissertation Abstracts International, 39*, 2887A.

*Kaplan, R. (1972). Some psychological benefits of an outdoor challenge program. *Environment and Behavior, 6*, 1–15.

*Kaplan, R. (1984). Wilderness perception and psychological benefits: An analysis of a continuing program. *Leisure Sciences, 6*, 271–290.

Kaplan, S., & Talbot, J. (1983). Psychological benefits of a wilderness experience. In I. Altman & J. Wohlwill (Eds.), *Behavior and the natural environment* (pp. 163–204). New York: Plenum.

*Kelly, F. J. (1974, April). *Outward Bound and delinquents: A ten year experience.* Paper presented at the Conference on Experiential Education, Estes Park, CO.

*Kelly, F. J., & Baer, D. J. (1968). *Outward Bound schools as an alternative to institutionalization for adolescent delinquent boys.* Boston, MA: Outward Bound, Inc.

*Kelly, F. J., & Baer, D. J. (1969). Jesness Inventory and self-concept means for delinquents before and after participation in Outward Bound. *Psychological Reports, 25*, 719–238.

*Kelly, F. J., & Baer, D. J. (1971). Physical challenge as a treatment for delinquency. *Crime and Delinquency, 17*, 437–443.

*Kimball, R. O. (1979). *Wilderness experience program: Final evaluation report.* Santa Fe, NM: Health and Environment Department, Behavioral Health Services Division. (ERIC Document Reproduction Service No. ED 179 327)

Krane, D., Hattie, J. A., & Houghton, S. (in press). Goal setting and the adventure experience. *Australian Journal of Psychology.*

Leiweke, J. T. (1976). The influence of the twenty-four day Outward Bound experience on self-actualization (Doctoral dissertation, Saint Louis University). *Dissertation Abstracts International, 37*, 3523A.

Lewicki, R. J. (1977). *Outward Bound and sensitivity training: Experiential learning in the wild.* Hanover, NH: Amos Tuck School of Business Administration, Dartmouth College.

Lowenstein, D. (1975). *Wilderness adventure programs: An activity profile.* Unpublished technical report, Pennsylvania State University. (ERIC Document Reproduction Service No. ED 127 102)

*MacKay, B. J. (1981). *The evaluation of outcomes of resident outdoor education: A study of selected Christchurch schools.* Unpublished master's thesis, University of

Canterbury, Christchurch, New Zealand.

Marsh, H. W. (1992). *Self Description Questionnaire (SDQ) III: A theoretical and empirical basis for the measurement of multiple dimensions of late adolescent self-concept; A test manual and a research monograph.* Macarthur, NSW, Australia: University of Western Sydney, Faculty of Education, Publication Unit.

Marsh, H. W. (in press). The measurement of physical self-concept: A construct validation approach. In K. F. J. Fox (Ed.), *The physical self: From motivation to well-being.* Champaign, IL: Human Kinetics.

Marsh, H. W., Byrne, B. M., & Shavelson, R. J. (1992). A multidimensional, hierarchical self-concept research. In R. P. Lipka & T. M. Brinthaupt (Eds.), *Studying the self: Perspectives across the life span* (pp. 44–95). New York: Teachers College Press.

Marsh, H. W., & Hattie, J. A. (1996). Theoretical models in self-concept. In B. Bracken (Ed.), *Handbook on self-concept* (pp. 38–90). Hillsdale, NJ: Erlbaum.

Marsh, H. W., & Peart, N. D. (1988). Competitive and cooperative physical fitness training programs for girls: Effects on fitness and on multidimensional self-concepts. *Journal of Sports Psychology, 10,* 390–407.

*Marsh, H. W., & Richards, G. E. (1986). The Rotter locus of control scale: The comparison of alternative response formats and implications for reliability, validity, and dimensionality. *Journal of Research in Personality, 20,* 509–528.

*Marsh, H. W., & Richards, G. E. (1987). The multidimensionality of the Rotter I-E scale and its higher-order structure: An application of confirmatory factor analysis. *Multivariate Behavioral Research, 22,* 3–69.

*Marsh, H. W., & Richards, G. E. (1988). The Outward Bound bridging course for low-achieving high school males: Effect on academic achievement and multidimensional self-concepts. *Australian Journal of Psychology, 40,* 281–298.

Marsh, H. W., & Richards, G. E. (1989). A test of bipolar and androgyny perspectives of masculinity and femininity: The effect of participation in an Outward Bound program. *Journal of Personality, 57,* 115–138.

*Marsh, H. W., & Richards, G. E. (1990). Self-other agreement and self-other differences on multidimensional self-concept ratings. *Australian Journal of Psychology, 42,* 31–45.

*Marsh, H. W., Richards, G. E., & Barnes, J. (1986a). Multidimensional self-concepts: The effect of participation in an Outward Bound program. *Journal of Personality and Social Psychology, 50,* 195–204.

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

Marsh, H. W., Richards, G. E., Johnson, S., Roche, L., & Tremayne, P. (1994). Physical Self-Description Questionnaire: Psychometric properties and a multitrait-multimethod analysis of relations to existing instruments. *Journal of Sport and Exercise Psychology, 16,* 270–305.

*Mason-Cox, S. (1992). *Locus of control and management training programmes.* Unpublished bachelor's thesis, University of Technology, Sydney, Australia.

Matthai, R. A. (1973). The effect of Outward Bound on sense of competence (Doctoral dissertation, Harvard University). *Dissertation Abstracts International, 34,* 7050A.

McCormick, I. A., Taylor, A. J., Rivolier, J., & Cazes, G. (1985). A psychometric study of stress and coping during the International Biomedical Expedition to the Antarctic (IBEA). *Journal of Human Stress, 11,* 150–156.

McIntyre, M. (1988). *Self-concept change as a result of an extended outdoor education residential experience.* Canberra, Australia: Canberra College of Advanced Education.

Miner, J. (1991, October). *A descriptive analysis of the experience based training and development field.* Paper presented at the meeting of the International Association for Experiential Education, Dartmouth, NH. (ERIC Document Reproduction Service No. ED 342 586)

Miner, J., & Boldt, J. (1981). *Outward Bound USA: Learning through experience in adventure-based education.* New York: William Morrow.

*Mitchell, H. A., & Mitchell, M. J. (1988). *A study of aspects of self-concept over a two-year period: Possible effects of an intervening Outward Bound course.* Nelson, New Zealand: Mitchell Research.

Neill, J. T. (1994). *The effect of Outward Bound high school programs on adolescents' self-concept, mental health, and coping strategies.* Unpublished honors thesis, Australian National University, Canberra.

*Neill, J. T., & Richards, G. E. (1991a). *An introduction to the Life Effectiveness Questionnaire (LEQ-G).* Canberra, Australia: Australian Outward Bound Foundation.

*Neill, J. T., & Richards, G. E. (1991b). *A preliminary analysis of an Outward Bound management program.* Canberra, Australia: Australian Outward Bound Foundation.

*Neill, J. T., & Richards, G. E. (1991c). *Preliminary results of the 4th Australian Outward Bound challenge course.* Canberra, Australia: Australian Outward Bound Foundation.

*Neill, J. T., & Richards, G. E. (1994a). *An analysis of a series of sail training voyages.* Canberra, Australia: National Outdoor Education and Leadership Services.

*Neill, J. T., & Richards, G. E. (1994b). *Results of the new Australian Outward Bound challenge courses.* Canberra, Australia: Australian Outward Bound Foundation.

*Neill, J. T., Richards, G. E., & Black, F. H. (1988). *Results of the new Australian Outward Bound challenge course.* Canberra, Australia: Australian Outward Bound Foundation.

Nold, J. (1976). *Growth and crises in a developing organization.* Denver, CO: Outward Bound School.

*Nussbaumer, I. R. (1988). *Physical self-concept and outdoor education.* Unpublished master's thesis, University of Western Australia, Perth.

Nye, R. (1976). The influence of an Outward Bound program on the self-concept of the participants (Doctoral dissertation, Temple University). *Dissertation Abstracts International, 46*(11), 142A.

*Owens, L., & Richards, G. E. (1979). *A study of the personal development outcomes of Outward Bound Australian standard courses.* Canberra, Australia: Australian Outward Bound Foundation.

Parkhurst, M. J. (1983). A study of the perceived influence of a Minnesota Outward Bound course on the lives of selected women graduates (Doctoral dissertation, University of Oregon). *Dissertation Abstracts International, 44,* 3491A.

*Parle, M. D. (1986). *The role of self-efficacy in Outward Bound: An investigation of a high school course.* Unpublished bachelor's honors dissertation, University of New England, Armidale, New South Wales, Australia.

Plato. (1920). Protagoras. In A. Cubberley (Ed.), *Readings in the history of education* (pp. 4–6). New York: Houghton-Mifflin.

Pollack, R. (1976). *An annotated bibliography of the literature and research on Outward Bound and related programs.* Boone, NC: North Carolina Outward Bound School. (ERIC Document Reproduction Service No. ED 171 476)

*Porter, W. (1975). *The development and evaluation of a therapeutic wilderness program for problem youth.* Unpublished doctoral dissertation, University of Denver.

Powers, K. R. (1983). The effects of physical challenge training on self-concept and

locus of control (Doctoral dissertation, University of Pittsburgh). *Dissertation Abstracts International, 44,* 2364A.

Priest, S. (1993). A new model for risk taking. *Journal of Experiential Education, 16,* 50–53.

Priest, S., & Gass, M. (1993). Five generations of facilitated learning from adventure experiences. *Journal of Adventure Education and Outdoor Education, 10,* 23–25.

Rawson, M. (1973). Residential short-term camping for children with behavior problems: A behavior modification approach. *Child Welfare, 52,* 511–520.

Rhoades, J. S. (1972). The problem of individual change in Outward Bound: An application of change and transfer theory (Doctoral dissertation, University of Massachusetts). *Dissertation Abstracts International, 33,* 4922A.

Richards, G. E. (1975). *Leadership and Outward Bound: A public view of Outward Bound leadership training.* Canberra, Australia: National Outdoor Education and Leadership Services.

Richards, G. E. (1976). *Some psychological bases and aspects of Outward Bound.* Canberra, Australia: National Outdoor Education and Leadership Services.

Richards, G. E. (1977). *Some educational implications and contributions of Outward Bound.* Canberra, Australia: National Outdoor Education and Leadership Services.

Richards, G. E. (1987, January). *Outdoor education in Australia in relation to the Norman Conquest, a Greek olive grove and the external perspective of a horse's mouth.* Paper presented at the 5th National Outdoor Education Conference, Perth, Western Australia.

*Richards, G. E. (1990). *Results of an Australian Outward Bound management program for young sales executives.* Canberra, Australia: Australian Outward Bound Foundation.

*Richards, G. E., Barrett, J., & Brown, H. (1990). A *research evaluation of developmental outcomes of Outward Bound Australia's middle management development programs for Melbourne Water.* Canberra, Australia: Australian Outward Bound Foundation.

*Richards, G. E., Barrett, J. D., Medhurst, T. G., & Smith, G. A. (1991). *A research evaluation of the developmental outcomes of the Outward Bound management training and corporate development program with the Regent Hotel of Sydney.* Canberra, Australia: Australian Outward Bound Foundation.

*Richards, G. E., Barrett, J. D., Morrison, B., & Seidel, J. (1992). *A research evaluation of the developmental outcomes of the Outward Bound Australia/NCR sales professional development programs 1989–1991.* Canberra, Australia: Australian Outward Bound Foundation.

*Richards, G. E., Barrett, J. D., Neill, J. T., & Seidel, J. A. (1992). *A research evaluation of the developmental outcomes of Young Endeavour's ten day sail training voyages.* Canberra, Australia: Australian Outward Bound Foundation.

*Richards, G. E., Lee, S. A., & Barrett, J. D. (1993). *Outward Bound NCR sales professional development program.* Canberra, Australia: Australian Outward Bound Foundation.

*Richards, G. E., & Neill, J. T. (1993a). *Analysis of outcomes of Australian Outward Bound management training and corporate development programs using the LEQ-F.* Canberra, Australia: Australian Outward Bound Foundation.

*Richards, G. E., & Neill, J. T. (1993b). *Analysis of outcomes of a 26-day standard Australian Outward Bound program.* Canberra, Australia: Australian Outward Bound Foundation.

*Richards, G. E., & Neill, J. T. (1993c). *Analysis of outcomes of the experimental 26-day standard Australian Outward Bound program.* Canberra, Australia: Australian Outward Bound Foundation.

Richards, G. E., & Neill, J. T. (1996). *Use of effect-sizes for ongoing development of Outward Bound programs*. Canberra, Australia: Australian Outward Bound Foundation.

*Richards, G. E., Neill, J. T., & Black, F. H. (1993). *Effectiveness of a revised experimental model of the Australian Outward Bound standard course*. Canberra, Australia: Australian Outward Bound Foundation.

*Richards, G. E., & Richards, M. J. F. (1981). *Australian Outward Bound bridging course 1981: An investigation and evaluation of an Outward Bound remedial program*. Canberra, Australia: Australian Outward Bound Foundation.

*Richards, G. E., van Gelder, J., & Neill, J. T. (1993). *Physical fitness changes on an Australian Outward Bound standard course*. Canberra, Australia: Australian Outward Bound Foundation.

*Richards, G. E., van Gelder, J., & Neill, J. T. (1994). *Locus of control changes on an Outward Bound standard course*. Canberra, Australia: Australian Outward Bound Foundation.

Riggins, R. D. (1985). The Colorado Outward Bound School: Biographical and personality factors contributing to the leadership effectiveness of instructors. *Journal of Environmental Education, 16*, 6–11.

*Ringer, M. (1994, April). *Northland Support Wilderness Experience*. Paper presented at the Adventure-Based Interventions Conference, Ambleside, England. (ERIC Document Reproduction Service No. ED 378 024)

Risk, P. H. (1976). The influence of Outward Bound school experience on self-concept, personality, and values (Doctoral dissertation, Michigan Sate University). *Dissertation Abstracts International, 37*, 6307B.

*Roland, C. C. (1981). *The transfer of an outdoor managerial training program to the work place*. Unpublished doctoral dissertation, Boston University.

Rossman, B., & Ulehla, J. (1977). Psychological reward values associated with wilderness use: A functional reinforcement approach. *Environment and Behavior, 9*, 41–66.

Royce, D. (1987). Adventure experience and affective learning: Where are we going? *Journal of Adventure Education, 4*, 12–14.

*Sachs, J. J., & Miller, S. R. (1992). The impact of a wilderness experience on the social interactions and social expectations of behaviorally disordered adolescents. *Behavioral Disorders, 17*, 89–98.

*Sakofs, M. (1992). Assessing the impact of the Wilderness Alternative for Youth programme: An Outward Bound programme for adjudicated youth. *The Journal of Adventure Education and Outdoor Leadership, 9*, 16–21.

*Sakofs, M., & Schurman, D. (1991). *Assessing the impact of the Wilderness Alternative for Youth: An Outward Bound program for adjudicated youth*. Greenwich, CT: Corbam Resources. (ERIC Document Reproduction Service No. ED 339 556)

Scherl, L. A. (1982). *Participants, their perceptions, expectations and reactions towards an Outward Bound adult program: A preliminary study*. Unpublished manuscript, James Cook University, Townsville, Queensland, Australia.

Scherl, L. A. (1986, May). *Self in wilderness: Is personal control a viable notion for understanding individual-wilderness interaction?* Paper presented at the 15th Annual Meeting of the Australian Social Psychologists, Magnet Island, Queensland, Australia.

Scherl, L. A. (1988). Constructions of a wilderness experience: Using the repertory grid technique in a natural setting. *Australian Psychologist, 23*, 225–242.

Scherl, L. A., & Smithson, M. (1986, May). *A new dimension to content analysis: Exploring relationships among thematic categories*. Paper presented at the 15th Annual Meeting of the Australian Social Psychologists, Magnet Island, Queensland,

Australia.

Schulte, S. W. (1975). *Examination of certification of white water paddlers as a way to increase safety in white water paddling.* Unpublished master's thesis, University of Missouri.

Shafer, E. L., & Mietz, J. (1969). Aesthetic and emotional experiences rate high with Northwest wilderness hikers. *Environment and Behavior, 1,* 187–197.

Shavelson, R., Hubner, J., & Stanton, G. C. (1976). Self-concept: Validation of construct interpretations. *Review of Educational Research, 46,* 407–441.

Shore, A. (1977). *Outward Bound: A reference volume.* Greenwich, CT: Topp Litho.

*Smathers, K. (1975, May). O*utward Bound in the professional education of teachers: A study of an experimental component in field experiences.* Paper presented at the National Conference on Outdoor Pursuits, Appalachian State University, Boone, NC.

Smith, M. A. W. (1971). An investigation of the effects of an Outward Bound experience on selected personality factors and behaviors of high school juniors (Doctoral dissertation, University of Oregon). *Dissertation Abstracts International, 32,* 6141A.

*Smith, M. L. (1976). *Final report: Experimental study of the effects of Outward Bound.* Boulder: University of Colorado, School of Education, Bureau of Educational Field Services.

*Smith, M. L., Gabriel, R., Schott, J., & Padia, W. L. (1975). *Evaluation of the effects of Outward Bound.* Unpublished manuscript, University of Colorado, School of Education, Laboratory of Educational Research, Bureau of Educational Field Services, Boulder.

*Spacht, R. J. (1982). *The relationship between environmental concern and a selected high adventure program.* Unpublished manuscript, James Madison University, Harrisburg, VA.

Stich, T. F. (1983). Experiential therapy for psychiatric patients. *Journal of Experiential Education, 5*(3), 23–30.

Stogner, J. (1978). The effects of a wilderness experience on self-concept and academic performance (Doctoral dissertation, Virginia Polytechnic Institute and State University). *Dissertation Abstracts International, 39,* 4704A.

Stoltz, P. G. (1992). An examination of leadership development in the great outdoors. *Human Resource Development Quarterly, 3,* 357–372.

Stremba, R. H. (1977). A study of the relationship between participation in an Outward Bound program and changes to self-esteem and locus of control (Doctoral dissertation, Indiana University). *Dissertation Abstracts International, 38,* 3300A.

Strutt, B. E. (1966). The influence of Outward Bound courses on the personality of girls. *Research in Physical Education, 1,* 1–10.

*Stuckey, J. M. (1975). Changes in self-description of teachers as a result of Outward Bound experiences (Doctoral dissertation, American University). *Dissertation Abstracts International, 35,* 779A.

*Thorstenson, C. T., & Heaps, R. A. (1973). Outdoor survival and its implications for rehabilitation. *Therapeutic Recreation Journal, 5,* 31–33.

*Thorvaldsen, S. A., & Matheson, M. A. (1976). *The Boulder Bay experiment.* Vancouver, British Columbia, Canada: Department of the Attorney-General, Criminal Justice Planning and Research Unit.

Walsh, V., & Golins, G. (1976). *The exploration of the Outward Bound process.* Denver, CO: Colorado Outward Bound. (ERIC Document Reproduction Service No. ED 144 754)

Watts, F. N., Webster, S. M., Morley, C. J., & Cohen, J. (1992). Expedition stress and personality change. *British Journal of Psychology, 83,* 337–341.

Wells, S. G. (1978). Factors involved in the attrition of adventure-based experiential educators (Doctoral dissertation, University of Northern Colorado). *Dissertation*

Abstracts International, 39, 1936A–1937A.

*Wetmore, R. C. (1972). The influence of Outward Bound school experience on the self-concept of adolescent boys (Doctoral dissertation, Boston University). *Dissertation Abstracts International, 33*, 1498A.

*Wichmann, T. (1991). Of wilderness and circles: Evaluating a therapeutic model for wilderness adventure programs. *Journal of Experiential Education, 14*, 43–48.

*Willman, H. C., & Chun, F. Y. F. (1973). Homeward bound: An alternative to the institutionalization of adjudicated juvenile offenders. *Federal Probation, 37*, 52–57.

Wilson, R. (1981). *Inside Outward Bound*. Charlotte, NC: East Wood.

*Wright, A. (1982). Therapeutic potential of the Outward Bound process: An evaluation of a treatment program for juvenile delinquents (Doctoral dissertation, Pennsylvania State University). *Dissertation Abstracts International, 43*, 923A.

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