An Empirical Look at Walsh and Golins' Adventure Education Process Model: Relationships between Antecedent Factors, Perceptions of Characteristics of an Adventure Education Experience, and Changes in Self-Efficacy

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This study looks at essential aspects of the Walsh and Golins (1976) model of the Outward Bound process in the context of current adventure education literature and theory and seeks to test the relationships between participant antecedent factors, perceptions of characteristics of an adventure experience, and self-efficacy. Findings supported the importance of participant antecedent factors in the adventure experience. Participant motives and expectations were most strongly related to perceptions of characteristics of the adventure experience (personal empowerment and learning relevance). Perceptions of personal empowerment and learning relevance were found to be associated with changes in reported self-efficacy. The anticipated direct link between the antecedent factors and the changes in self-efficacy was not supported by this study. Additionally, a decrease in socially desirable responses was reported at course completion. Implications for practice and future research are discussed.

KEYWORDS: *Adventure education, outdoor recreation, empirical model testing.*

Adventure-based and outdoor experiential programs remain popular for recreational, developmental, and therapeutic uses. Adventure based programs are used in schools, community programs, camps, and corporate settings around the globe. The abundance of affirmative research and evaluation findings supports the notion that these programs have the potential to enact change in participants and groups among a variety of populations and a number of environmental settings (e.g., Hattie, Marsh, Neill, & Richards, 1997; Hans, 2000; Cason & Gillis, 1994). While the preponderance of positive research findings indicates that development (e.g., increases in self-esteem, self-efficacy, trust, group cohesion) through adventure based programs is possible, how and why this development occurs remains less clear.

Given the breadth of adventure applications, and the abundance of out-come-based research, it is critical to the continued success of the field that closer examination is afforded to the process behind adventure education and to the identification of specific programmatic and design components that are most critical to fostering developmental outcomes. While many have called for such research (Ewert, 1989; Hanna, 1992; Hattie, et al., 1997; Henderson & Fox, 1994; Kelley, Coursey, & Selby, 1997; Klint, 1999; Scherl 1990; Warner, 1999), few quality studies are available to guide practice, and programming decisions remain largely an enigmatic process based on gut instinct, past experience, and borrowed or untested philosophical understanding or belief.

A cadre of philosophers and theoreticians have offered models of the adventure process (e.g., Kiewa, 1994; Luckner & Nadler, 1997; Walsh & Golins, 1976), some of which are largely accepted as doctrine within the industry. For example, the Walsh and Golins model includes a motivated (a) learner or program participant being placed into a prescribed (b) social and (c) physical environment where he or she masters specific (d) problem solving tasks. The course (e) instructor acts as a guide to ensure that the tasks are both authentic and manageable and provides the necessary feedback to aid mastery, which, in turn, leads to participant development (e.g., an increase in self-esteem).[1] While some readers may argue that this model is atheoretical, it has resonated with practice, a fact to which longevity and popularity attest; it is difficult to find a text on adventure-based programs without the Walsh and Golins citation (e.g., Ewert, 1989; Miles & Priest, 1999; Priest & Gass, 1997). While it is widely accepted that the (a) individual, the (b) social environment, the (c) physical environment, the (d) task structure, and the course (e) instructor are critical to participant development, the interrelationships between these areas remains poorly documented by empirical studies.

Research that has addressed the process and programmatic factors related to developmental outcomes has identified several potential areas warranting further investigation. This study focuses on two of these areas: antecedent variables and characteristics of the experience. Antecedent variables are those that the participants bring with them into the program; examples include age, gender, expectations, motivations, past experience, and pre-existing beliefs. The characteristics of the experience are the emergent perceptions during the program; examples include perceptions of the social environment, the level of instructor support, and how empowered the students feel during a program. How important these areas are to a program's developmental goals remains largely unknown.

While it is commonly believed that programs can be designed for specific goals and objectives, it is possible that each program is too distinctive

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[1]The letters (a-e) in parenthesis are provided to assist the reader in tracking the critical components of the Walsh and Golins model that are explored through the literature, results, and discussion sections of this study.

in nature to offer useful generalizations. Perhaps it is the unique mix of personalities and group specific experiences that enhance or diminish the effectiveness of any given program. Perhaps it is the logistical constraints of the program, for example duration or physical environment, that make a difference in program effectiveness.

This study has two purposes. The primary purpose is to determine if adventure program participants' antecedent factors, perceptions of characteristics of their experiences, and changes in their self-efficacy are related. Specifically, this study tests the relationships between antecedent factors and perceptions of characteristics of the experience, antecedent factors and changes in self-efficacy, and characteristics of the experience and changes in self-efficacy. The secondary purpose is to determine if a social desirability response bias is present in measurement in adventure education research.

Throughout this study, the term adventure education is used to discuss experiential programs, such as the one investigated in this study, that use adventure to achieve educational or developmental goals. Developmental programs seek to change the way participants behave, think, and feel through both direction and reflection (Priest & Gass, 1997). Conversely, recreational adventure programs are primarily for fun and enjoyment and therapeutic adventure programs aim to decrease dysfunctional action (Priest & Gass, 1997). While some of this study's findings may be relevant to these other adventure program types, the research and literature focuses on educational and developmental programs.

Literature Review

Past research and theoretical efforts offer guidance for more targeted investigation. This section synthesizes the current thoughts on the focus areas of this study: antecedent variables, the characteristics of the experience, and self-efficacy as an outcome variable in adventure programming. Measurement issues are also considered.

Antecedent Components

Each learner or participant (a) brings a unique set of characteristics into an adventure program. Ewert's (1989) model of the participation in outdoor adventure, proposes that participants' predisposing factors and beliefs are antecedents that play a critical role in framing the adventure experience. The research that addresses these antecedent variables has taken two different focuses: participant demographics and participant psychographics.

Researchers have proposed that the participants' demographics such as age, gender, ethnicity, socio-economic status, and family relationships are related to developmental gains during adventure programs. Research on age has found some differences in program outcomes (e.g., Ewert, 1988, 1988a; Sahler & Carpenter, 1989). Research on gender has shown that male and

female participants may react differently to adventure program participation (e.g., Ewert, 1988a; Kelley, et al., 1997; Finkenberg, Shows, & DiNucci, 1994; Propst & Koesler, 1998), but other research has failed to find these differences (e.g., Gass, 1990; Gass 1991). Some researchers have found that demographic variables explain little of the development that occurs during experiential programs (Conrad & Hedin, 1982). Thus, demographic variables, while important, provide an incomplete picture of what determines who will grow and develop during a program.

Additionally, it is thought that participants' psychographics (e.g., values, opinions, beliefs) explain a portion of the developmental gains from adventure programming. If participants come to adventure programs believing they will change, this expectation may be the main reason that gains are observed upon program completion (Ewert, 1988, 1988a; Herbert, 1998). Studies commonly note that program (and study) participants are volunteers who not only have a desire to change, but are highly motivated to attend (e.g., Lemmon, LaTourette, & Hauver, 1996; Marsh & Richards, 1989; Watts, Cohen, Toplis, 1996). These psychographic factors make causal inferences from program design to developmental gains difficult to isolate. As Herbert (1998) wrote, "subsequent research should investigate attitudinal, motivational, and perceptual differences between persons who wish to participate and those who do not wish to participate in adventure programs" (paragraph 32).

While the research on antecedents is inconclusive, it is generally agreed that individual participants may realize different outcomes from the same program (Hanna, 1995; McIntyre & Roggenbuck, 1998), and that more research is need in this area (Hattie, et al., 1997).

Characteristics of the Experience

Conrad and Hedin (1982) first proposed that it was students' individual perceptions of their own experiences that contributed most to participant development in experiential programs. While many of these perceptions, such as perceived empowerment and social support, have long been considered instrumental to program success, little substantive research has directly addressed these issues in an adventure education context.

Conrad and Hedin (1982) conducted a comprehensive study of the psychological, social and intellectual development of secondary school students enrolled in experiential education programs. Participants were approximately 4,000 students in 33 separate programs. Program types assessed in the study included volunteer service, career internships, outdoor adventure, and community study/political action. Questionnaire data were collected on program features, student characteristics, and characteristics of the individual student's experience in an effort to explain the sources of participant development. Program features (nature of experience, length, intensity, and reflective component) as well as student characteristics (age, grade point average, socio-economic status), when combined, explained less than 8% of

the variance in social and psychological development. However, character-
istics of the individual student's experience (autonomy, collegial relationship
with adults) accounted for 15 to 20% of the variance in the outcome mea-
sures. The characteristics that related best to outcome gains included ques-
tions such as "discussed experiences with my teachers," "did things myself,"
"had adult responsibilities," and "felt I made a contribution" (Conrad &
Hedin, 1981, p. 47).

Witman (1993) used the Conrad and Hedin (1982) study as a founda-
tion for his study to determine which characteristics of the experience were
most valued by program participants and by a panel of experts. The ten
program characteristics most valued by program participants included help-
ing/assisting others, being personally empowered, taking risks/meeting chal-
lenges, realizing the importance of caring about self and others, getting the
support of other participants, doing trust activities, feeling like part of the
group, setting/accomplishing goals, being playful/having fun, learning from
failures, and doing problem solving activities. It is interesting that when com-
paring the above results with the survey results of the adventure expert panel
($n = 11$), while "a significant, positive correlation of moderate strength (r
$= .55$, $p = <.01$) was found" (Witman, 1993, p. 47), the experts generally
rated "content" items more important than participants. Witman concludes
that program participants value "process" more than "content". This dis-
crepancy calls into question the role of the specific problem solving tasks
proposed as necessary in the Walsh and Golins (1976) model.

Thus, characteristics of the experience encompassing group relation-
ships, meaningful interaction with staff members, and the perception of em-
powerment were seen as valuable program components by participants. Task
structure and relevance, while less substantiated by participant reporting, is
thought valuable by professionals. The next three sections take a deeper look
at the role of the social environment (b), the course instructor (e), and the
task structure and relevance (d).

The role of the social environment.   Adventure education professionals have
generally believed the role of group dynamics and group size is important
to program success. Walsh and Golins (1976) posit that a unique social en-
vironment co-created by the participants and the program leaders is an es-
sential component of the adventure process. Today, almost any text on ad-
venture education addresses group processes (e.g., Priest & Gass, 1997;
Schoel, Proudy, & Radcliff, 1988; Smith, Roland, Havens, & Hoyt, 1992).
Additionally, it is widely acknowledged social and group dynamics are even
more important in teenage groups as adolescents often look to their peers
for models to make sense of their changing world and evolving roles (Pin-
trich & Schunk, 1996; Thomas, 1990).

While an abundance of writing describes programs based on models of
group cooperation and empowerment, some research has taken a more in-
depth look at the importance of the group process in adventure programs.
In a study of participants at a weeklong adventure camp, Hastie (1995) con-

cluded that the student social system made the program successful. The student involvement and social system seemed to promote the development of responsibility, communication skills, and a tolerance or appreciation for others. Student involvement and peer feedback were natural functions of combining interesting tasks in a supportive group atmosphere, allowing students to learn from one another's successes and failures in a non-threatening, non-competitive, and supportive environment.

Humberstone and others (Humberstone, 1990; Humberstone & Lynch, 1991) found similar results in their qualitative studies of adolescents in adventure programs. They posit that empowerment and both peer and staff social support help students to "see themselves and each other from a different angle" (Humberstone & Lynch, 1991, p. 213). While Humberstone's studies support the idea that adventure programs with heterogeneous groupings can help break down gender based stereotypes, the data also support a broader changing of personal perceptions towards others.

Other research has supported relationships between group functioning and degree of isolation (Leon, Kanfer, Huffman, & Dupree, 1994), differences in course sequencing (Bisson, 1998), course progress or time (Oakes, Haslam, Morrison, & Graces, 1995), and group type (Ewert & Heywood, 1991). However, too little group research is available on outdoor and adventure education, and much of the research that is available has been borrowed from other fields (McAvoy, Mitten, Stringer, Steckart, & Sproles, 1996).

In summary, it appears that the social environment posited by Walsh and Golins (1976) is critical to student learning but remains inadequately studied. However, from what is known, groups that offer empowerment, student involvement, and meaningful relationships with peers and staff seem to provide the optimal social environment for participant development.

The role of the instructor. Aside from their inextricable roles as group members, the program leaders or instructors play important roles in the success or failure of an adventure program. The leader, through modeling and facilitating, helps establish desirable group norms (Luckner & Nadler, 1997; Schoel, et al., 1988). Additionally, it is the program leader, through implementation of the program, who provides necessary instruction and an important source of feedback to the program participants. While the leader is an acknowledged component in all adventure process models (e.g., Kiewa, 1994; Luckner & Nadler, 1997; Walsh & Golins, 1976), and some descriptive and theoretical pieces on adventure program instructors have been published (e.g., Phipps & Claxton, 1997; Priest, 1995), empirical research on the instructor's role in the process is lacking (Cason & Gillis, 1994; Hattie et al., 1997).

The research that has examined the instructor's role supports the importance of the instructor in the group and participant experience. O'Brien (1990) found that the quality of the relationship with the adult instructor was related to the participants' perceptions of program performance. Specifically, O'Brien found that the quality of the relationship with the adult

program leader was a significant predictor of "(a) how well they (students) had done on the course, (b) how they felt about themselves after the course, and (c) whether they expected the course to help them in everyday life" (p. 53). Using multiple regression, Wichmann (1991) found that experienced staff with higher expectations for student outcomes realized greater reduction in participants' asocial behavior. From the existing theory and research on the instructor's role, it is likely that instructor support and influence on group and social norms play important roles in participant development. Additionally, it is widely acknowledged that the instructors guide the group through logistical and programmatic decisions using their knowledge, skills, and experience.

   Task structure and relevance. One of the central premises of the Walsh and Golins (1976) model is the structure and relevance of specific problem solving tasks. In this model, these task characteristics are critical since it is the mastery of the necessary course tasks that ultimately leads to participant growth.

   Adventure program research has not focused on task value and structure, but a few relevant studies do exist. In a qualitative study of adventure participants, Sibthorp (2000-b) found that the completion of tasks necessary for existence in the course environment was critical to learning new skills. Sibthorp posits that "the most important learning comes from the social interaction and the efficacy developed in dealing with the necessary living tasks inherent in adventure settings. These "tasks" and the isolation become authentic through the adventure experience and create an effective microcosm for practicing valuable life skills" (p. 101). Hastie (1995) proposed that authentic tasks provide the necessary structure for the student driven social system and that it is through student involvement in task selection and modification that the social system is created and empowerment is realized. Education literature has also looked at the participants' perceptions of task value and relevance and the relationship between this perception and learning. Wigfield and Eccles propose that the utility value or usefulness of the perceived task is directly related to the student propensity for learning the skills required for task completion (e.g., Eccles & Wigfield, 1995; Wigfield & Eccles, 1994). While the research on task structure and relevance in adventure programs is limited, it indicates that necessary and authentic tasks provide a platform for group social systems and empowerment.

   While there is some research on how the adventure process works and which components of the process participants value, the relationships between process components and program outcomes remains elusive. However, based on the existing theory and research, it seems that, as proposed by Walsh and Golins (1976), a supportive and empowering social environment (b) that facilitates accomplishment and feedback through the completion of relevant tasks (d) as well as meaningful contact with adult instructors (e) and peers provides the optimal learning environment.

Structural Components

In any adventure model, some factors can be varied and manipulated by the program and the course instructor, but logistical constraints determine other program components. Practicality and accessibility often limit the specific physical environment (c), the program content, and the duration of the course. While, undoubtedly, these structural components play a critical role in providing an authentic and unfamiliar platform for learning, they are assumed constant for purposes of this study.

Developmental Outcomes and Self-Efficacy

Walsh and Golins (1976) proposed that, through the adventure process, global development (e.g., self-concept) is realized. However, since their model emerged, researchers have completed numerous studies on the developmental outcomes associated with adventure education programs, and the current research has been focused on more targeted, multidimensional constructs that better capture program and course specific goals.

Multidimensionality in adventure program research has been noted using the Self-Descriptive Questionnaire (Marsh, Richards, & Barnes, 1986; 1987; Marsh & Richards, 1988), the Tennessee Self Concept Scale (Gillett, Thomas, Skok, & McLaughlin, 1991; Hazelworth & Wilson, 1990), and the Personal Orientation Inventory (Vogel, 1988-1989; Yaffey, 1992). Other researchers using outcome measures closely aligned with the program's goals have also found significant gains (Sable, 1995; Sahler & Carpenter, 1989).

While adventure program goals vary, many purport to increase confidence in leadership, working in teams, and social functioning. Task specific confidences such as these are best measured through self-efficacy.

Self-efficacy has repeatedly proven to be an accurate and superior estimate of performance on specific tasks (e.g., Bandura 1977; Rabinowitz, Melamed, Weisberg, Tal, & Ribak, 1992; Vongjaturapat, 1993), and is a theoretically sound outcome for adventure education assessment. This has been acknowledged by both the number of research studies using self-efficacy as an outcome variable (e.g., Davis-Berman & Berman, 1989, 1994; Iso-Ahola, LeVerde, & Graefe, 1989; Kelley et al., 1997; Propst & Koeseler, 1998; Wright, 1983) and by theoretical papers (e.g., Ewert, 1989; Hart & Silka, 1997; Klint, 1999; McGowan, 1986).

According to Bandura, "perceived self-efficacy refers to beliefs in one's capabilities to organize and execute the courses of action required to manage prospective situations. Efficacy beliefs influence how people think, feel, motivate themselves, and act" (1995, p. 2). Self-efficacy has three principal dimensions: level, strength, and generality (Bandura, 1997). Level refers to the depth of one's efficacy perceptions regarding a particular domain of functioning. Strength of the efficacy belief refers to the perception of one's confidence in her ability to function in the specified domain. Generality

refers to the breadth of the domain. Self-efficacy strength is the primary focus of this study.

Bandura's modes of self-efficacy development mesh well with the critical components of the adventure education process as posited by Walsh and Golins (1976). According to Bandura (1997), efficacy is developed through mastery experience, vicarious experience, social persuasion, and physiological and emotional status. In Walsh and Golins' model, a learner is placed into a unique physical and social environment and given characteristic problems to solve that lead to mastery which in turn leads to global learning (e.g., increases in self-concept). Mastery is required in the unfamiliar physical environment; it provides an abundance of new tasks that require learning by doing. Vicarious experiences are provided through both mastery models by the instructors and through coping models by the other participants. Social persuasion is provided by both peer and staff through the encouragement and feedback provided in the supportive group environment. Additionally, these new skills are often emotionally involving since many include some element of perceived risk. These circumstances combine to make an adventure experience ideal for self-efficacy development, especially in youth.

Adolescent development was the focus of Kurt Hahn's original vision for learning through adventure, and he clearly made the distinction that he wanted to train youth through adventure and not for adventure (Miner & Boldt, 1981). Development remains one of the primary goals of many adventure education programs, and such programs provide a fertile setting for the development of increased self-efficacy. Adolescents, more than adults, rely on the coping models provided by their peers and seek adult role models that exemplify valued skills and traits.

Unfortunately, increased self-efficacy is far from a panacea. Schwarzer and Fuchs (1995) write, "many young people do understand the risks they are taking but choose to ignore them because they weigh other values more heavily" (p. 260). Some believe that increased efficacy may give adolescents the confidence to attempt drinking, smoking, sex, or worse (Pintrich & Schunk, 1996). Adolescents may be self-efficacious and have high self-esteem, but still be too ego-involved to be autonomous. The peer pressure still influences their choices, and in a sense their efficacy and esteem are contingent upon peer acceptance.

While the current body of research on efficacy development in adventure education remains porous, some findings are helpful in creating a better understanding of self-efficacy's relationship with adventure based programs. Propst and Koeseler (1998) found that feedback and mentoring are important in the development of outdoor leadership efficacy. While the direct transferability of self-efficacy developed on adventure programs is both supported (Paxton & McAvoy, 1998), refuted (Cockrell, 1990), and thought more complex than a direct relationship (Iso Ahola, et al. 1988), it is nevertheless believed that self-efficacy development can and should be given

more attention in adventure education research (Ewert, 1989; Hans, 2000; Klint, 1999).

Measurement Concerns

The Hawthorne effect, social-desirability response bias, and post group euphoria are regarded as confounding problems in the measurement of adventure program outcomes (Ewert, 1988; 1988a; Fry & Heubeck, 1998; Hattie, et al., 1997; Marsh et al., 1986, 1987; Oakes et al., 1995). It is possible that because the respondents know that they are part of a research study, they indicate post-program gains. Alternatively, if participants think that they should grow or develop as a result of the program, it is possible that the elevation in post program self reports are the result of this expectation or of a positive affect towards the adventure experience. Thus, participants may respond in a socially desirable manner, or in a manner that they believe is preferred by researchers, program supervisors, or others with access to the study results. However, this hypothesis can be tested through the inclusion of a scale that should theoretically remain consistent from program start to finish. Several studies have looked at embedded lie scales (Finkenberg et al., 1994; Rawson & Barnett, 1993) in an attempt to detect this effect. Other researchers have looked at components of self-concept or self-esteem (e.g., academic or home) that should, theoretically, remain constant through the program (e.g., Gillett et al., 1991; Marsh et al., 1986). The results of these studies remain mixed, but artificially high post-program scores remains a measurement concern. Hattie, et al. (1997) recommend that future research "include scales unrelated to expected outcomes to act as a type of control" (p. 72).

Methods

Youth who participated in the study were clients of Broadreach, a commercial provider of summer adventure programs for teenagers. All the Broadreach programs include traditional adventure education processes such as full-value contracts, leadership responsibilities, and structured feedback and debriefings (Schoel et al., 1989). The overt program goals include developing teamwork skills, leadership skills, conflict resolution skills, and personal responsibility/regulation.

The staff comes from a variety of backgrounds. Some are professional outdoor educators; others are schoolteachers. Others have little formal instructional background, but are accomplished sailors or travelers. Whatever their background, all staff members are required to attend a four day staff training session where they learn the program philosophy and get a chance to practice necessary skills.

Participants are assigned to a specific course based on requested dates, space availability, level of experience, and age; all course participants are approximately the same age (within a two year range). The groups are coed,

and every attempt is made to have an equal number of male and female participants. A group consists of 9-11 participants and 2 or 3 staff members. Usually none of the participants know other group members before meeting on the course.

During the summer of 1999, participants in for this study were involved in one of two programs: Underwater Discoveries (UWD), for non certified divers, or Underwater Discoveries Advanced (UDA), for certified divers. Both programs are 3 weeks long and teach sailing and diving aboard 45' catamarans in the Leeward Islands. While these programs vary by level of experience, both the UDA and UWD visit the same islands, contain similar program components, and in many cases do the same, or very similar activities. The main difference in the two programs is the level of dive training.

A typical program involved a couple of days of orientation and group setup. Subsequently, the participants took on leadership roles, which included activity selection and scheduling, work responsibilities necessary to keep the boats operational, and daily goal setting sessions. Course responsibilities were gradually shifted from the course instructors to the participants.

During the summer of 1999, 16 UWD and 11 UDA courses were run. The courses were run over three program sessions with staggered arrival so that two groups of students arrived each day. This population provided a large sample of adolescents experiencing similar programs. Many adventure programs have fewer than 300 participants a year or vary course length or content. Such course variations confound comparison problems.

Recruitment

All of the 301 students that participated in the UDA and UWD programs in the summer of 1999 were asked to volunteer for this study. Before the participant's arrival at the course location, letters explaining the study were sent to the participants and the parents at their home addresses. If either the participant or the participant's parent did not wish the student to participate in the study, they returned a postage prepaid postcard to the researcher and the student was not asked to complete any of the questionnaire information.

Subject Characteristics

The nature and expense of the Broadreach programs attracts mostly upper-middle class European-American students from the United States. Of the 301 participants in the UWD and UDA programs during the summer of 1999, fifty nine percent were on the Underwater Discoveries program, 50% were male, and the average age was 15.2 years.

Analyses

Three separate analyses were completed during this study. These included confirmation of measures, canonical analyses to test for relationships between variable sets, and a *t*-test to test for social desirability response bias.

Confirmation of measures. Because self-efficacy strength is generally considered task (or at least domain) specific, an applicable measure was necessary for use with adolescent participants on an adventure education program. It was decided to focus on three domains of self-efficacy directly related to the program goals: leadership, social functioning, and self-regulation. Initially, an item pool was adapted from existing instrumentation (e.g., Bandura, 1989; Connolly, 1989; Sherer, Maddux, Mercandante, Prentice, Dunn, Jacobs, & Rogers, 1982) and subjected to expert review by three Broadreach program directors, a faculty member with expertise in adventure education, and three doctoral students with expertise in outdoor experiential education. The initial self-efficacy item pool included 56 items identified as useful and applicable for measuring the three domains by the reviewers (24 items for social efficacy, 21 items for leadership efficacy, and 11 items for self-regulatory efficacy). The efficacy items asked respondents to rate performance tasks on a six-point scale from 0% (very uncertain) to 100% (very certain). An example question from each domain follows: "How certain are you that you could": Help a new friend to feel comfortable with your old friends (Social Efficacy), Help the group to set its own goals (Leadership Efficacy), or Motivate yourself to complete your school work (Self-regulatory Efficacy).

The initial characteristic of the experience measure was based on Conrad and Hedin's (1981) Characteristics of the Community Experience Checklist, Gray and Pattersons' (1994) School Life Questionnaire, and group leader assessment questions used by O'Brien (1990). After expert review (same expert pool and process as above), 52 items were retained to measure four domains: task relevance (11 items), instructor support (15 items), group support (14 items), and perceived empowerment (12 items). Participants were asked to rate their experiences over the last 3 weeks, during their course on a five-point scale from "Almost Never" to "Almost Always". Since this scale was restructured after the factor analysis, sample items are reported in the results section.

While measurement of the demographic antecedent variables was straightforward, motivations and expectations were measured with single item indicators on a 1 to 10 scale. The decision to use single item indicators was made to trade accuracy for brevity during the field-based data collection phase in which participants were already being asked to complete over a hundred items.

Each participant was asked to complete the measure of social, leadership, and self-regulatory efficacy upon arrival at the program location. This instrument also contained questions about past experience, age, gender, motivation to attend, expectations for learning, and expectation to change. Par-

ticipants were asked to create a self-selected code for compiling pretest and posttest data while maintaining anonymity. Upon completion of the program, the participants were asked to again complete the self-efficacy instrument as well as an instrument that measured their perceptions of characteristics of their experience.

Post group euphoria or a social desirability response bias remains a possible problem with measurement in adventure education. While the studies in adventure education have found mixed results when using unrelated scales, social desirability response bias is an accepted limitation of self-report instruments (Hopkins, 1986). For this reason, it was decided to include an existing social desirability scale with a portion of the instruments administered for this study. The M-C 1 version of the New Social Desirability Scale (NSDS) (Strahan & Gerbasi, 1972), a short version of the Marlow-Crowne Social Desirability Scale (M-C SDS) (Crowne & Marlowe, 1960), was included to detect any artificial score elevation at posttest. This 10-item scale was selected over alternatives because it was short enough to be successfully used in the field-based data collection. Strahan and Gerbasi tested the MC-1 NSDS and found K-R 20 coefficients of between .59 and .70 for four samples. They also found that the correlation between the M-C SDS and their M-C 1 NSDS were in the .80s and .90s for all four samples.

Canonical analyses. Three canonical analyses were performed to examine the relationships between the three variable sets (antecedent, characteristics of the experience, and self-efficacy variables, see Figure 1). A canonical correlation is similar to a regression equation with multiple independent and dependent variables and is the most appropriate method for determining shared variance between the variable sets given the purpose and limitations of the current study. Alternative forms of multivariate analysis (e.g., Path Modeling and Structural Equation Modeling) require solid theoretical models and substantial sample sizes not available for the current study.

In each canonical analysis, a random number of subjects were selected to meet the sample size criteria proposed by Thorndike (1978). The remaining subjects formed a holdout group for crossvalidation. Thorndike (1978) proposed that the number of subjects necessary for a canonical analysis could be determined by squaring the sum of the number of independent and dependent variables and then adding 50. For example, a canonical analysis between three independent and five dependent variables would need a sample of 114 subjects $((3 + 5)^2 + 50)$.

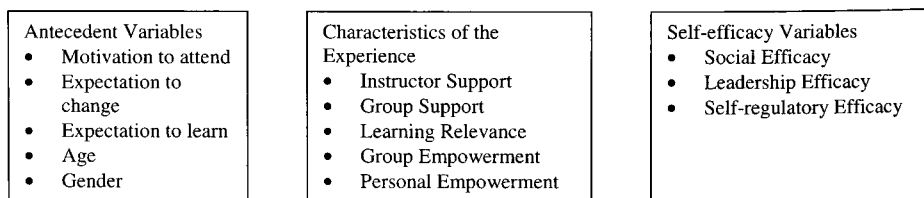| Antecedent Variables	Characteristics of the Experience	Self-efficacy Variables
• Motivation to attend	• Instructor Support	• Social Efficacy
• Expectation to change	• Group Support	• Leadership Efficacy
• Expectation to learn	• Learning Relevance	• Self-regulatory Efficacy
• Age	• Group Empowerment	
• Gender	• Personal Empowerment	

Figure 1. Model of Variables Explored through Canonical Analysis.

Canonical correlations found to be statistically significant ($p < .05$) using Wilk's Lambda were interpreted. Variable to variate correlations, or loadings, of .3 or above were considered part of the variate (Tabachnik & Fidell, 1996). Using the canonical component loadings (also know as canonical loadings, structure coefficients, or correlations between the variable and the variate) for interpretation is considered superior to using the standardized function coefficients since the standardized function coefficients are determined by the mathematical solution and thus ignore shared variance not represented in this mathematical solution (Christensen, 1983; Tabachnik & Fidell, 1996; Thompson, 1984).

Crossvalidation, or an index of invariance, is considered necessary in canonical analysis (Thompson, 1984; Thorndike, 1978). Using the holdout groups, variate scores were calculated for each participant by multiplying the raw canonical coefficients by the sub-scale composite scores for each significant canonical R (R_c). These variate scores were then correlated. A statistically significant correlation of similar magnitude to the canonical correlation under investigation indicates crossvalidation and supports generalizability of the canonical findings. Standardized coefficients were examined to determine which variables were important in the mathematical solution during crossvalidation.

Social desirability. Pre and post test data for the M-C 1 New Social Desirability Scale were collected from a subset of the program participants. The data were screened for missing data and incomplete questionnaires. Once the negative scores were reversed, the pretest and posttest social desirability score was calculated for each respondent. The pretest and posttest means were then compared using a paired t-test ($p < .05$, two tailed).

Results

Questionnaire results were collected from 253 subjects. However, after matching complete pre and post data and screening for univariate and multivariate outliers, 191 subjects were retained for canonical analyses. Sixty percent were on the Underwater Discoveries program, 44% were male, and the average age was 15.3 years.

Confirmation of Measures

Six of the 56 self-efficacy items were eliminated because of profound ceiling effects. The remaining 50 items were factor analyzed (principal axis factor extraction with oblique rotation) using the pretest sample, which consisted of 253 useable questionnaires. The Cattell (1966) scree test was used in conjunction with theory to determine the appropriate number of factors. Both the scree test and the theoretical scale design indicated a 3-factor solution. To develop homogeneous sub-scales, only items that loaded on a single factor were retained. Additionally, items not loading above .3 or those reported as confusing by the respondents were deleted. Lastly, separate analyses were run for both the male and female participants to assess the utility

of future comparisons by sex; the factor structure was largely consistent for both male and female study participants. The three efficacy subscales used in this study were retained: social efficacy (12 items), leadership efficacy (13 items), and self-regulatory efficacy (4 items). For additional information on the instrument development portions of this study, see Sibthorp (2000-a).

After scale confirmation, subscale scores were created by summing the individual items for each subscale and change scores from pre to post program were calculated. The mean and standard deviation for each change score follow (no change is represented by 0): social efficacy change, M = 1.52, SD = 6.70; leadership efficacy change, M = .515, SD = 6.88; self-regulatory efficacy change, M = .727, SD = 3.68.[2]

The 52 characteristics of the experience items were factor analyzed (principal axis factor extraction with oblique rotation) using the posttest sample, which consisted of 234 useable questionnaires. By examining the scree plot, a four-factor solution was initially selected. This solution was consistent with the proposed factors of task relevance, instructor support, group support, and empowerment. However, the four-factor extraction proved difficult to interpret. Tabchnick and Fidell (1996) recommend extracting one factor above and one factor below the criteria indicated break point. Therefore three and five-factor solutions were attempted. The five-factor solution was conceptually sound and easily interpreted. As with the self-efficacy scale, items not loading above .3, those loading on 2 or more factors, or those reported as confusing by the respondents were deleted. In the five-factor solution the "task relevance" factor was renamed "learning relevance" and the empowerment domain split into two discrete factors: personal empowerment and group empowerment. The items retained formed five subscales: perceptions of personal empowerment (5 items), group empowerment (3 items), group support (5 items), instructor support (5 items), and task relevance was renamed to learning relevance (6 items). Typical questions for each subscale follow: "I had important responsibilities" (Personal Empowerment), "My group worked well together" (Group Support), "I felt appreciated by at least one of my instructors" (Instructor Support), "My group, not just my instructor, made important decisions about our program" (Group Empowerment), "I felt that what I was learning was relevant to my life" (Learning Relevance). For additional information on instrument development, see Sibthorp (2000-a).

After confirming the scales, subscale scores were summed to create the five characteristics of the experience composite scores: group empowerment, M = 11.93, SD = 2.49; personal empowerment, M = 21.211, SD = 3.01; task relevance, M = 21.36, SD = 2.96; group support, M = 18.88, SD = 3.46; and instructor support, M = 21.72, SD = 3.29.

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[2]While not an explicit hypothesis of this study, it is interesting to note that the changes reported from course start to finish are small. Though this study is seeking to determine if programmatic factors are related to either increases or decreases in reports of self-efficacy, this small increase is interesting taken in conjunction with both the number of studies finding developmental gains

Measurement of the Antecedent Variables proved problematic as several of the single item indicators exhibited ceiling or floor effects. The past participation, motivation to attend, and expectation to learn variables were highly skewed (see Table 1). Therefore, they were coded into the following dichotomous categories: past participation in a Broadreach or similar program vs. non participation, highly motivated to attend (9 or 10) vs. motivated (8 or less), and high expectations for learning (9 or 10) vs. expectations to learn (8 or less). Gender is a true dichotomy. Age variable and the Expectations to Change variable distributions were not sufficiently skewed to warrant categorical coding.

Canonical Analyses

Only the first canonical correlation for the characteristic of the experience and the efficacy variables was significant ($Rc = .38$, $p = .022$). The first pair of canonical variates indicates that subjects who felt personally empowered (.93), perceived the program learning as relevant (.74), and, to a lesser extent, felt their group was empowered (.40), and felt supported by both the group (.36) and the instructor (.59) were associated with realized increases in self-regulatory (.90), social (.64), and leadership (.47) efficacy.[3] Standardized coefficients and redundancy indices are reported in Table 2.

The first canonical correlation between the antecedent and self-efficacy variables non-significant ($Rc = .28$, $p < .05$). Thus, additional interpretation is not appropriate.

A third canonical analysis was performed between the antecedent variables and the characteristics of the experience variables. Only the first canonical correlation was significant ($Rc = .50$, $p = .007$). The first pair of canonical variates indicates that subjects who were most highly motivated to

TABLE 1
Descriptive Statistics for Antecedent Variables

	Mean	Median	Standard Deviation	Skewness[a]	Kurtosis[b]
Past Participation	.70	0	1.68	4.27	20.98
Motivation to Attend	8.51	9	1.64	−1.67	3.80
Expectation to Learn	8.60	9	1.42	−1.18	1.53
Expectation to Change	6.05	6	2.15	−0.53	0.25

[a]Standard Error = .155
[b]Standard Error = .309

[3]The numbers presented in parentheses following the variable names represent the variable to variate correlation or canonical loadings. These provide an index of how well each variable is represented in the variates that are used in the canonical analysis.

TABLE 2
First Canonical Variate for Characteristics of the Experience and Self-Efficacy Canonical Correlation

	Canonical Variable to Variate Correlation (Canonical Loadings)	Standardized Coefficient
Characteristics of the Experience Variables (predictor)		
Instructor Support	.59	.18
Group Support	.36	−.06
Learning Relevance	.74	.33
Group Empowerment	.40	−.36
Personal Empowerment	.93	.92
% Variance	.41	
Redundancy	.06	
Self-efficacy Variables (criterion)		
Social Efficacy Change	.64	.47
Leadership Efficacy Change	.47	−.04
Self-Regulatory Efficacy Change	.90	.80
% Variance	.48	
Redundancy	.07	

attend (.69), with high expectations of learning (.61), and expecting to change (.51) held more positive perceptions of characteristics of the experience at program completion. All characteristics of the experience loadings were significant and ranged from .57 to .89. While not as clear because of the lower canonical loadings, age (.33) and gender (.41) may also be related to positive characteristics of the experience perception, with older or female students holding more positive perceptions than younger or male students (see Table 3).

All canonical correlations were crossvalidated with a holdout group of the respondents. The crossvalidated correlation (Pearson r) for the characteristics of the experience variables and the efficacy variables was .215 ($p = .07$). The cross validated correlation (Pearson r) for the antecedent variable set and the characteristics of the experience variable set was .33 ($p = .029$). While these values support the existence of relationships between the respective variable sets, the changes in magnitude from the original canonical correlations ($Rc = .38$, and $Rc = .50$ respectively) raises uncertainty regarding the strength of such a relationships

Social Desirability

A paired t-test was used to test for possible post group euphoria. A subset of participants ($n = 60$) were given the short version of the New Social Desirability Scale along with the pre and post tests. The scale has a range of 0 to 10, with 10 being the least affected by the tendency to answer in a socially

TABLE 3

First Canonical Variate for Antecedent and Characteristics of the Experience Canonical Correlation

	Canonical Variable to Variate Correlation (Canonical Loadings)	Standardized Coefficient
Antecedent Variables (predictor)		
Motivation to Attend	.69	.63
Expectation to Learn	.61	.33
Similar Participation in the Past	−.11	−.07
Expectation to Change	.51	.32
Age	.33	.22
Gender	.41	.32
% Variance	.23	
Redundancy	.06	
Characteristics of the Experience Variables (criterion)		
Instructor Support	.64	.13
Group Support	.60	.20
Learning Relevance	.87	.48
Group Empowerment	.57	−.16
Personal Empowerment	.89	.52
% Variance	.53	
Redundancy	.13	

desirable manner. Thus, a lower score represents a greater propensity for providing a socially desirable response. After deletion of the multivariate outliers from canonical analysis and the removal of subjects with incomplete scores, the pre and posttest scores of the social desirability scale were compared using a t-test ($n = 46$). The means were statistically different ($p = .009$) and increased from a pretest value of 5.78 ($SD = 1.44$) to a post test value of 6.44 ($SD = 1.61$), indicating that at the posttest the respondents were less inclined to answer in a socially desirable manner. That is, participants exhibited fewer socially desirable responses at course completion.

Discussion

In an effort to test the importance of key adventure program factors posited by Walsh and Golins (1976), hypothesized relationships between antecedent factors, participants' perceptions of characteristics of their adventure experiences, and changes in self-efficacy were examined. Additionally, the presence of a social desirability response bias was assessed.

The results of the first canonical analysis generally supported the Walsh and Golins (1976) model and the related literature and the theory of adventure education (e.g., Priest & Gass, 1997; Schoel et al., 1989). That is, programs in which the students feel more empowered and more supported

realized more developmental gains from the program. Results from the second canonical analysis do not support the hypothesized relationship (e.g., Ewert, 1988; Herbert, 1998) that antecedent variables such as motivation are linked to developmental outcomes. However, this possibility cannot be eliminated and additional research in this area remains necessary due to the limitations of this study (as discussed below). The results of the third canonical analysis indicate that some antecedent variables are related to the student perceptions of their experience, even if these same antecedents are not as directly related to developmental outcomes.

While the main intent of this study was to determine if relationships between the variable sets existed, the canonical loadings do offer the potential for additional interpretation of relationships between individual variables. The variables with the highest canonical loadings, sometimes called marker variables (Tabachnik & Fidell, 1996), best define the underlying variates or factors. For the first significant canonical analysis, this would seem to indicate that students who felt personally empowered and felt that the learning was relevant, also indicated a greater change in their ability to self-regulate their lives. Conversely, students who felt less empowered during their courses reported feeling less capable of self-regulation at program completion.

The second significant canonical correlation likewise offers potential interpretation for individual variables. The highest loading variables on the antecedent side were motivation to attend, expectation to learn, and expectation to change. It seems possible that these variables may be identifying an underlying variable related to attitude towards attendance. Interestingly, the variate on the characteristics of the experience side is again best represented by the perceptions of learning relevance and personal empowerment variables. It conceptually follows that those who had a more positive attitude toward attendance might have also had a more complete picture of the what the program would entail and saw it as both more relevant to their lives and felt more invested in the program; those who had a less positive attitude might be less invested and consider the course less personally relevant. Thus, they influenced the primary variable over which they had the most control: their own personal involvement in the course. A positive or negative attitude could less directly influence the instructor support, group functioning, or group empowerment, but it could directly lead to more or less personal investment and involvement in the program.

Since antecedent factors do seem to play an integral role in the adventure experience, but a direct relationship between the antecedent variables and changes in self-efficacy was not evident, it is likely that the program characteristics are acting as mediating variables between antecedents and developmental outcomes. This is consistent with current research on more general recreational experiences. Vitterso, Vorkinn, and Vistad (2001) posit that cognitive processing provides a medium for interaction between pre-experience perceptions or expectations and actual on-site recreational experiences to produce outcomes. Thus, students with the predisposing factors

to develop during a program may only realize this potential through program experiences that include empowerment, relevance, support, and other characteristics not addressed through this study.

Antecedent factors do seem to play a central role in the adventure experience. However, practitioners have to question the utility of this information about antecedents in an industry that traditionally has the course instructor meeting the participants for the first time on the course start day. While some of the antecedent variables are unalterable, the ones that were the best predictors in this study seem to form an attitudinal construct which can be changed both before the participant arrives through screening and better managing course expectations and once the participant arrives on the program through proper program set-up and orientation.

Additionally, while the social desirability scale was included to determine if an artificial posttest elevation was present (a premise not supported in this study), the results showing a decrease in socially desirable responses is interesting. Several reasons are possible for this finding. First, the respondents might have become suspicious of the social desirability scale since it was not imbedded in the self-efficacy instrument. This suspicion might have produced more honest responses during the posttest. Second, it is possible that the respondents felt more invested in the research process by the end of the program. This might have influenced them to take more time to read, digest, and answer the questions honestly. Third, the respondents could have been less concerned about the ramifications of their test responses. It is possible that despite completing the instruments in a confidential and non-threatening manner, that the students were inhibited about answering honestly during the pretest. Thus, the less socially desirable responses at posttest might indicate a propensity towards less reserved responses. Fourth, it is possible that the decrease in socially desirable responses was caused by course participation. Some believe that benefits of adventure education participation include heightened awareness and more accurate assessments of personal strengths and weaknesses (Watts et al., 1996; Wheeler, Goldie, & Hicks, 1998). As noted in self-efficacy theory (Bandura, 1982), accurate appraisals of one's abilities are generally advantageous. Thus, if this interpretation is correct, the measure of social desirability is not unrelated to the program outcomes, but rather is another index of a specific life skill (i.e. accuracy or honesty of self-perception). While the lack of research on social desirability in adventure education research limits comparisons with other studies, it is evident that more research in this area is needed.

In summary, antecedent and characteristics of the experience variables are central pieces of the adventure process puzzle, and increased awareness remains a potential program outcome needing more research attention. However, precise interpretations remain largely speculative given the nature of a canonical analysis and the limitations of the current study.

Several limitations of this study should be noted. First, the scales, still under development during the data collection, and the antecedent measures, intentionally left brief because of the logistical constraints of a field

administration, offered less than ideal precision. Thus, the data integrity was
likely reduced. However, the results are promising enough that the relation-
ships under study should be further investigated with more refined instru-
mentation. Second, canonical solutions, while appropriate for this study, are
empirically generated and sometimes difficult to interpret. Thus, additional
research is necessary to untangle the specific relationships and to attribute
causation. Third, the shared variance identified by the canonical analyses
remains relatively small (as indicated by the magnitude of the canonical Rs
and the redundancy indices). While it is likely that this is partially attribut-
able to the measurement issues identified above, there are obviously addi-
tional program factors that warrant consideration. Fourth, the focus on a
single program with a somewhat homogeneous population limits the study's
external generalizability. Fifth, Hull, Stewart, and colleagues (Hull, Stewart,
& Yi, 1992; Stewart & Hull, 1992) have found that experience perceptions
(such as those measured by the characteristics of the experience measures)
change over time and challenge the assumption that post hoc experience
measures are good indices of "on program" experience. This raises an in-
teresting question about the timing and stability of the relationships exam-
ined in this study. That is, if the students perceived their group to evolve
from less to more cohesive or conversely from more to less cohesive, or if
the level of group empowerment was modified as the course progressed,
would the results differ?

Implications for Future Research

The results of this study, while promising, are merely a hint at the po-
tential of dissecting the adventure experience. Targeted examination of the
programmatic and participant factors that are most important to develop-
mental outcomes will require several essential actions: broader identification
of critical components of the experience, additional instrument development
and multiple measurement approaches, and a shift to conceptual general-
izability in lieu of the traditional focus on external generalizability.

While the exact relationships and interpretations are still debated, the
importance of programmatic factors, including both structural and charac-
teristics of the experience, is widely acknowledged. There is a clear need for
more research to identify which specific program factors are the best pre-
dictors of targeted program outcomes and which inhibit or promote the
effectiveness of other program factors.

While the antecedent factors and characteristics of the experience var-
iables seem to play a role in the change of developmental outcomes, several
additional variables also warrant attention. Structural components, including
the importance of the physical environment posited by Walsh and Golins
(1976), remain strong candidates to explain another portion of the variance
in development through adventure. While not definitive, there is support for
longer programs (Hattie et. al., 1997; Cason & Gillis, 1994), properly se-
quenced programs (Bisson, 1998), and programs with more therapeutic

goals and at least partly in residential settings (Hans, 2000) being more efficacious for participant development.

Measurement remains an issue. Targeted measures designed around the theory of adventure processes and directed to adventure education outcomes are necessary. Multiple measurement strategies that might be employed include qualitative, using the Experience Sampling Method (Larson & Csikszentmihalyi, 1983), and better data triangulation by collecting data from several sources and using complimentary measures and a variety of data collection procedures.

Lastly, adventure education research must move beyond only focusing on external generalizability and direct more attention on conceptual generalizability. While discussing the increased interest in the multiphasic nature of the leisure experience, Stewart (1998), makes the point that in order to better understand the leisure phenomenon, research needs to shift its focus from trying to generalize from a sample to a population and trying, instead, to link and create concepts and understand relationships that hold together beyond a specific sample or populations. This conceptual generalizability is just as relevant to the adventure phenomena as to leisure. Adventure, like leisure, is a rather abstract construct that is difficult to capture in a research study. However, by testing and modifying the models that do exist and continuing to develop new models, the adventure profession will arrive at a better understanding of what is happening during an adventure experience. This will likely start with a deeper understandings of how a single model or program works. Once a single program is understood, the model can be tested and modified to fit different situations, course designs, or programs. Perhaps multiple empirically tested models will emerge, or perhaps it will be determined that adventure models are program specific since they depend on factors such as population, setting, activity base, and organizational philosophy. However, it is this process of focusing on conceptual relationships that offers the most promise for the empirically model testing necessary to advance the understanding of adventure.

Walsh and Golins' (1976) model, because of it seminal position in the adventure education literature, provides a solid place to begin, but other models are available that warrant testing. Model building is not a simple process -it requires an understanding of philosophy, theory, history, and research. But with a focused effort, the utility of adventure as a developmental modality can be dissected, discussed, and, ultimately, better understood.

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