

## Factor Exploration and Confirmation for the Dimensions of an Adventure Experience

Simon Priest  
Brock University  
St. Catharines, Ontario, Canada

Behavior in an adventure recreation experience is based in part on perception of risk and competence. If incorrectly perceived, an unexpected condition may result, the outcomes of which may be socially, mentally or physically negative. To prevent such undesirable events, and to continue research in this arena, an understanding of the adventure experience is necessary in terms of the two constructs: perceived risk and perceived competence. This study performed a pair of factor analyses on the responses of first and second year subjects engaged in a ropes course program in order to explore and confirm factor structure of these two constructs. Subjects were responding to the Dimensions of an Adventure Experience (DAE) survey: a semantic differential of twenty four bipolar adjectives concerned with perceptual changes in risk and competence which may occur from participating in adventure experiences. The exploratory analysis formed three factors related to risk (fear, eustress, and distress) and two factors related to competence (abilities and attitudes). The confirmatory analysis formed the same factors with slightly different loading coefficients. From these findings, a combination of several theoretical models was achieved.

**KEYWORDS:** *Adventure, risk, competence, perception, ropes courses.*

### Introduction

A recent article by Ewert and Hollenhorst (1989) described adventure recreation as a "search for competence" (p. 125) coupled with "the valuation of risk and danger" (p. 127). There can be little doubt in the minds of recreationists that the challenging natures of their adventure experiences come from the interaction of situational risk and personal competence. For an adventure, in which the outcome is uncertain, recreationalists apply their competence to meet those risks, in an effort to exert control over the outcome and thus resolve the uncertainty in a successful manner (Mitchell, 1983).

Ewert and Hollenhorst's (1989) article explains that developing perceived competence through adventure experiences includes such constructs as experience, skill, knowledge, control, mastery, efficacy, and self-sufficiency. They further "speculate that the adventure recreationist's search for risk involves more than a search for competence perceptions" (p. 127). This means that adventures are more than perceived competence, they also involve constructs such as fear, anxiety, uncertainty, danger, challenge and perceived risk.

If Ewert and Hollenhorst's premise is correct, and this author believes it is, then one ought to be able to develop and test a model of the adventure

All things being equal, recreationists will seek out levels of risks which balance their levels of competence. A novice kayaker (low competence) will select easy rapids (low risks) and an expert rock climber (high competence) will choose tough climbing routes (high risks) in an effort to match up the values of risk and competence and receive a peak adventure. This works, provided the people are correct in their perceptions of situational risk and personal competence.

The timid and fearful person (incorrect at perceiving both) will likely make similar selections for the same reasons, but may miss the mark due to misperceptions. Timid and fearful recreationists will select levels of risk and competence thought to be equivalent and will expect a peak adventure (Figure 2). However, because in reality risks are lower and competence is actually higher, a challenging condition on the safe side of the razor's edge will likely result (Priest & Baillie, 1987).

Consider the less common antithesis of the timid and fearful: arrogant and fearless individuals. They too make selections based on perception, expecting a peak adventure, but again they overshoot their mark due to misperceptions. Arrogant and fearless recreationalists perceive themselves to be more competent than in reality and perceive the situation to be less risky than it actually is. Again, a challenging condition on the dangerous side of the razor's edge may result (Priest & Baillie, 1987).

Neither arrangement is desirable. Timid and fearful recreationists are destined not to express their potential for leisure or self-actualization, and arrogant and fearless recreationists are likely to get injured, or worse yet, take someone else with them. Perceptions of risk and competence may change with experience as recreationists learn from their mistakes, successes and failures. This process can be accelerated by an outdoor leader, who facilitates the adventure experience and guides reflection on experience by the individuals during a debriefing. Over time, they will move toward astuteness as their perceptions of risk and competence move toward those of reality (Carpenter & Priest, 1989).

Before research on changes in perceived risk and competence in adventure experiences can continue, the factor structure of the risk and competence constructs ought to be determined. An instrument known as the Dimensions of an Adventure Experience (DAE) survey was used in this study to accomplish that task. The intent of this research was to explore and confirm the factor structure for the DAE instrument, commonly used to track perceptions of risk and competence before, during and after adventure experiences. Once explored and confirmed, these factor structure findings might apply in combination with the findings of Ewert and Holtenhorst (1989).

#### Methodology

Two hundred and nine (209) first year, and twenty four (24) second year, university students (32% female, ages ranging from 17 to 22) were

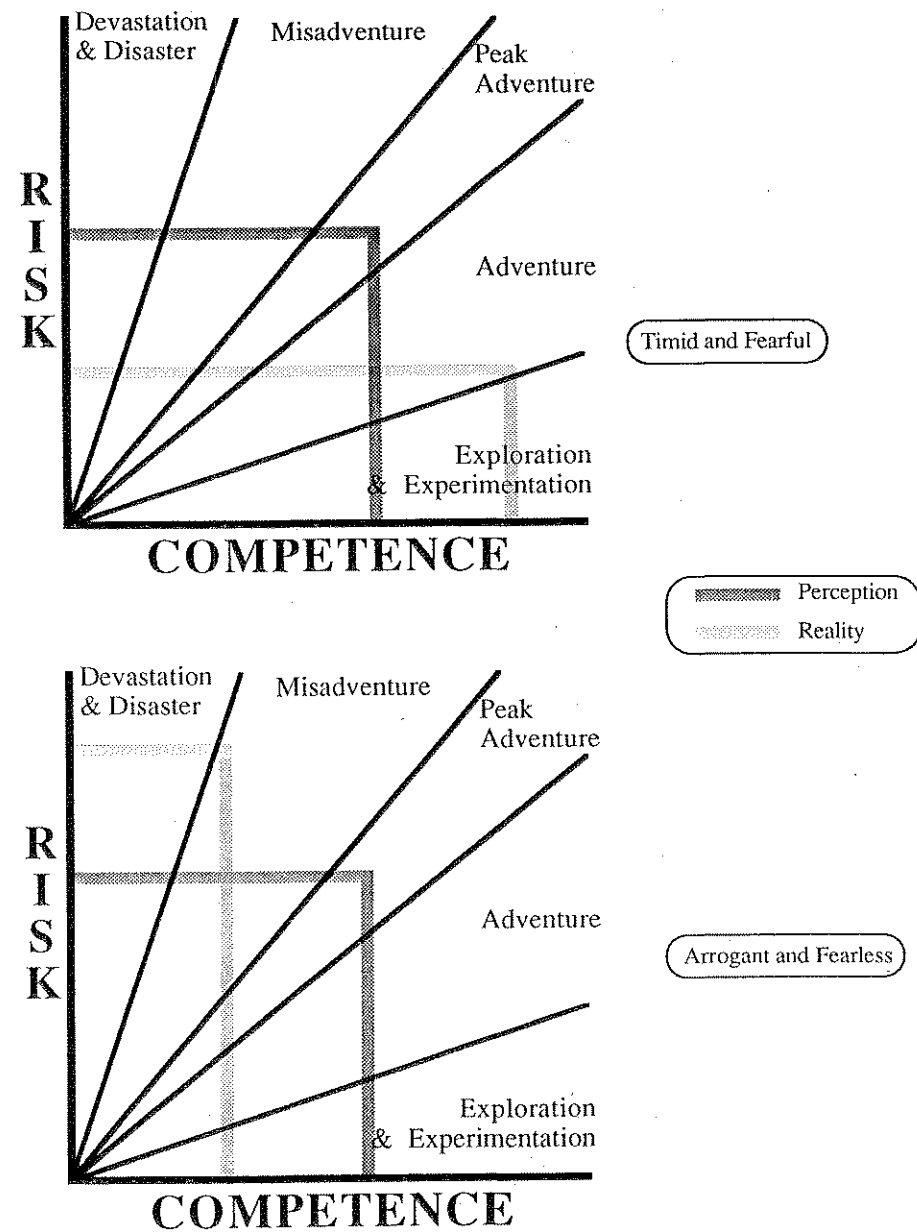


Figure 2: Profiles of timid and fearful & of arrogant and fearless recreationists.

involved in an adventurous experience. In this case the adventure was called "Venture Dynamics" (Bunting, 1985) at Texas A&M University and involved risk taking and competence testing on an artificially constructed ropes course. The population consisted of all first year students enrolled in "Venture Dynamics I" (an introduction to experiencing the ropes course) and all second year students enrolled in "Venture Dynamics II" (a more advanced opportunity to learn about using the ropes course as an educational tool) over a one year period. For the most part, second year students were more experienced than first year students by having taken Venture Dynamics I during a previous semester. All students in the two courses were surveyed, and no student was enrolled in both courses at the same time or was surveyed twice.

The ropes course in this instance was composed of several high elements built among trees approximately twenty to thirty feet above ground level. Students walked, crawled, climbed and jumped along cables, ropes, planks and logs between the trees, while on a safety belay (which prevented them from falling should they make a minor error in calculation). The concept of a ropes course has been around for several decades and is a commonly accepted methodology in the disciplines of adventure-based experiential learning or outdoor adventure education. Although an artificially constructed adventure environ, ropes courses have all the elements of any other adventure activities like canoeing or climbing: uncertain outcome, perceived risk, competence involvement, and true dangers, even though minimized by safety devices such as PFD's or ropes. (Rohnke, 1977).

Since adventures are defined as having uncertain outcomes and being a state of mind, and since they must necessarily include intrinsic motivation and a perception of free choice (Mitchell, 1983), subjects were given the freedom to decide on which of the activities they would like to be challenged. In other words, they were free to select risks which fit with their competence, but such selection was based on personal perceptions. The adventures chosen had obvious perceived risks (fear of heights, potential embarrassment, failure, etc.), but the real risks were controlled at very low levels (helmets and harnesses were worn, safety belay lines were used, and a supportive trusting feeling was engendered in subjects). This provided the atmosphere of adventure to be present, without truly or immorally endangering anyone. Nevertheless, confronting the perceived risks (while so high above hard ground) was every bit as adventurous as less controlled activities like canoeing or climbing.

Subjects were asked by the same research assistant to complete the DAE during their adventure experience by independently filling out the instrument while high up in the trees (either immediately before or immediately after attempting the chosen activity, but while alone and still actively engaged in the adventure). Since the DAE is typically used to measure self-reported changes in perception, this testing arrangement ensured a sampling of both pre and post settings, while more importantly catching subjects' perceptions in the height of their action and uninfluenced by friends or others.

The DAE is a modified semantic differential scale composed of twenty four bipolar adjective pairs (Priest, 1987). Twelve pairs addressed the adventure dimension of risk (eg. dangerous - safe or harmless - harmful) and the other twelve addressed competence (eg. skill - unskilled or vulnerable - invincible). The principle modification of the DAE lies in the manner of response. Typical semantic differentials provide a series of blank foils between the bipolar adjectives and the respondents simply tick the blank space which best represents their opinion, making the data format nominal. The DAE presents a continuous number line between the bipolar adjectives and asks respondents to place a mark (X) on the line at the point which best represents their opinion, thereby making the data format truly interval in nature. Scoring is simply accomplished by measuring with a ruler from the negative word (0 cm) to the positive word (10 cm), where directionality is arranged by randomly mixing up the order of positive and negative pairings for the 24 items.

The DAE also includes an opportunity for subjects to report their perception of the risks inherent in their chosen activity and their perception of their personal competence to deal with those risks on a continuous scale from 0 (low) to 10 (high) units. Content and face validity for the DAE were established by an expert panel of outdoor adventure instructors. Test-retest reliability, with 48 third year university students enrolled in an outdoor leadership course, using alternate forms of the instrument with rearrangements of the 24 items, provided a 0.93 coefficient of stability.

Data collected from the first year students were subjected to two exploratory factor analyses, one for the twelve pairs connected with the dimension of perceived risk ( $n = 202$  with 7 missing values) and one for the twelve pairs addressing perceived competence ( $n = 199$  with 10 missing values). The factor structure, which evolved from this exploration, was then tested against the responses from the second year students by means of two confirmatory factor analyses ( $n = 24$  with 0 missing values). All factor analyses employed principal component analysis as the factoring procedure (Eigen value  $> 1.0$ ) and orthotran/varimax rotation as the transformation method (loading coefficient  $> 0.4$ ).

## Results and Discussion

Central tendencies for perceived risk and perceived competence were quite close for the two groups of subjects as presented below (Figure 3). Perceptions were rated on a scale from 0 (low) to 10 (high). First year subjects mean (SD) perceived risk was 4.6 (2.3) and perceived competence was 6.8 (2.1). Second year subjects mean (SD) perceived risk was 4.2 (2.2) and perceived competence was 6.7 (1.7). Independent *t*-tests failed to find significance ( $p < 0.05$ ) between the perceptions of risk and competence for the two groups ( $t = 0.803$ ;  $t = 0.196$ ). Therefore, and for the purposes of this study only, the first and second year groups of subjects were considered homogeneous and worthy of inclusion in exploratory and confirmatory factor analyses respectively.

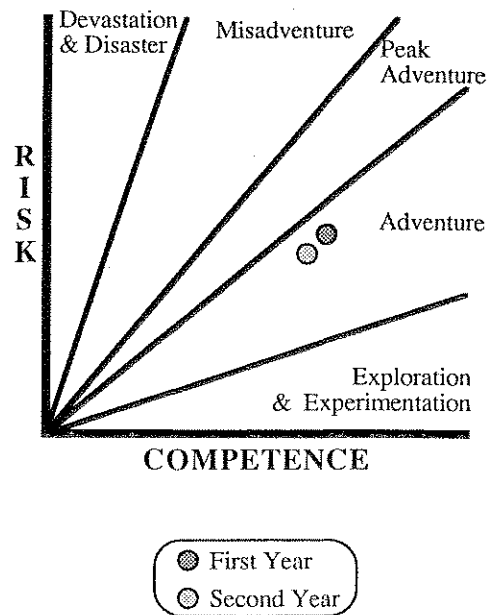


Figure 3: Centroids of perceived risk and perceived competence for first and second year subjects.

Exploratory factor analysis for the sets of dimensions related to perceived risk and to perceived competence arose with variance proportions of 59% and 67% respectively. Three factors formed for the items addressing perceived risk and two factors were noted for the items connected with perceived competence. Factor structures for the two exploratory analyses, showing all loading coefficients, are detailed below (Tables 1 and 2).

For perceived risk, the factor with the strongest Eigen value contained items associated with harm, danger, hazard and exposure. This factor was termed "Fear of risk" as these items appeared to be things one might be afraid of or might give rise to fears (Ewert, 1988). The next factor contained items of excitement, positivity, stimulation and challenge. These seemed to be stress related items, but all were pleasant, hence the "risk Eustress" label. The last factor was composed of tension, uncertainty, threat, difficulty, and also included negativity (a strongly negative loading of the positivity item). Again these seemed to be stress related items, but all were somewhat unpleasant, hence the "risk Distress" label.

For perceived competence, the first factor was composed of "Attitudes" such as capability, confidence, boldness, success, invincibility, superiority, strength and mastery. Also, the last three items had weak, but noticeable loadings on the second factor. This second factor was termed "Abilities" or the items of experience, expertise, skill, and proficiency.

TABLE 1  
Exploration of factor structure (oblique solution & varimax rotation) for the DAE twelve bipolar adjective pairs related to perceived risk (N = 202).

ITEM	FEAR of risk	risk EUSTRESS	risk DISTRESS	Communality
Potential harm	.888	.187	-.174	.717
Danger	.862	-.001	-.038	.719
Hazard	.659	-.043	.298	.671
Exposure	.348	-.037	.005	.124
Excitement	.136	.775	-.066	.591
Positivity (Neg.)	-.002	.708	-.602	.681
Stimulation	-.134	.694	.179	.573
Challenge	.005	.678	.181	.551
Tension	-.174	.252	.763	.666
Uncertainty	.115	-.182	.705	.545
Threat	.181	.216	.623	.618
Difficulty	.119	.373	.566	.626
Eigen value	3.692	2.179	1.210	
Variance proportion	.308	.182	.101	Total = .591

The two confirmatory factor analyses for perceived risk and perceived competence dimensions gave variance proportions of 75% and 67% respectively. Once again, perceived risk showed a three factor structure and perceived competence had two factors. Factor structures for the confirmatory analyses are presented with only noticeable key loading coefficients for reasons of clarity (Tables 3 and 4).

TABLE 2  
Exploration of factor structure (oblique solution & varimax rotation) for the DAE twelve bipolar adjective pairs related to perceived competence (N = 199).

ITEM	ATTITUDES	ABILITIES	Communality
Capability	.934	-.166	.735
Confidence	.810	.055	.705
Boldness	.775	.003	.573
Success	.770	-.006	.588
Invincibility	.722	.073	.583
Superiority	.635	.287	.679
Strength	.579	.325	.640
Mastery	.550	.361	.642
Experience	-.158	.984	.828
Expertise	-.064	.946	.835
Skill	.038	.817	.702
Proficiency	.265	.559	.540
Eigen value	6.546	1.505	
Variance proportion	.545	.125	Total = .670

For perceived risk, precisely the same factor structure formed. Fear, eustress, and distress were present with the identical item content, but with slightly different proportions and order of loading coefficients. The only minor differences were the double loading of tension (equally strong on both eustress and distress factors) and again the dichotomy of the positivity - negativity item (which loaded strongest on the distress factor, but gain with the same negative polarization).

For perceived competence, two factors arose once more, but with reversed order of extraction. This time the abilities factor was first and the attitudes factor was second. The abilities factor contained more items; mastery, strength and superiority (items with noticeable secondary loadings from the earlier exploratory analysis) were added to the list. The attitudes factor contained the same items as before; the only expected item which did not load was mastery. All others were strongly present and those that switched to the other factor, still had noticeable loading coefficients for his factor. Lastly, capability double loaded on both factors, which makes some sense in keeping with the concept of abilities (capability was missing from this factor during the exploratory analysis).

### Conclusions

In their closing statements, Ewert and Hollenhorst (1989, p. 137) called for the development of "a behavioral as well as a self-assessment inventory" much like the standard rating schemes used to express the difficulty of adventure activities) to further research into adventure reaction. The DAE is one such instrument. It has been used to track the changes in perceived

TABLE 3  
Confirmation of factor structure (oblique solution & varimax) rotation for the DAE twelve bipolar adjective pairs related to perceived risk (N = 24).

ITEM	FEAR of risk	risk EUSTRESS	risk DISTRESS	Communality
Potential harm	.887			.849
Exposure	.856			.813
Danger	.842			.827
Hazard	.538			.671
Excitement		.909		.849
Challenge		.896		.831
Stimulation		.749		.807
Tension		.653	.519	.810
Positivity (Neg.)		.475	-.708	.662
Uncertainty			.754	.726
Threat			.682	.584
Difficulty			.486	.594
Eigen value	5.053	2.380	1.589	
Variance proportion	.421	.198	.132	Total = .751

TABLE 4  
Confirmation of factor structure (oblique solution & varimax rotation) for the DAE twelve bipolar adjective pairs related to perceived competence (N = 24).

ITEM	ABILITIES	ATTITUDES	Communality
Expertise	.970		.759
Skill	.932		.786
Mastery	.863		.842
Proficiency	.728		.680
Experience	.706		.668
Strength	.488	.388	.580
Capability	.476	.418	.603
Superiority	.443	.304	.425
Success		.922	.852
Confidence		.890	.810
Boldness		.816	.609
Invincibility		.657	.404
Eigen value	6.420	1.598	
Variance proportion	.535	.133	Total = .668

risk and perceived competence for subjects during adventurous outdoor and non-outdoor leisure experiences (Carpenter & Priest, 1990). The results of this study provide tentative support for the theories that, as a result of participating in adventure experiences, recreationists decrease their perceptions of the situational risks, increase their perception of personal competence, and move toward astuteness: where their perceptions are in line with reality.

The degree of challenge provided by an adventure experience depends upon the intermix of risk and competence levels. According to the findings of Ewert and Hollenhorst (1989), as the levels of risk rise, so will fear, eustress and distress. Social orientation will shift from programs and courses toward solos and small peer groups, because the latter provide greater risk. Environmental orientation will similarly shift from developed and controlled settings toward more natural and uncontrolled settings, again because the latter provide greater risk.

With regard to rising levels of competence, abilities and attitudes also rise. Locus of control becomes more intrinsic (vested in the individual) and less extrinsic (vested in the leader of the adventure activity). Skill and experience levels also increase, in concert with an increased frequency of participation in adventure recreation experiences. As competence is gained, the recreationist moves through three phases (introduction, development and commitment) associated with increasing risks. Ewert and Hollenhorst state conclusively, "as the self-reported experience level of the user increases, corresponding increases occur in frequency of participation, skill/expertise level, preferred level of risk, and internal locus of control. User preferences move toward more natural environments and social group

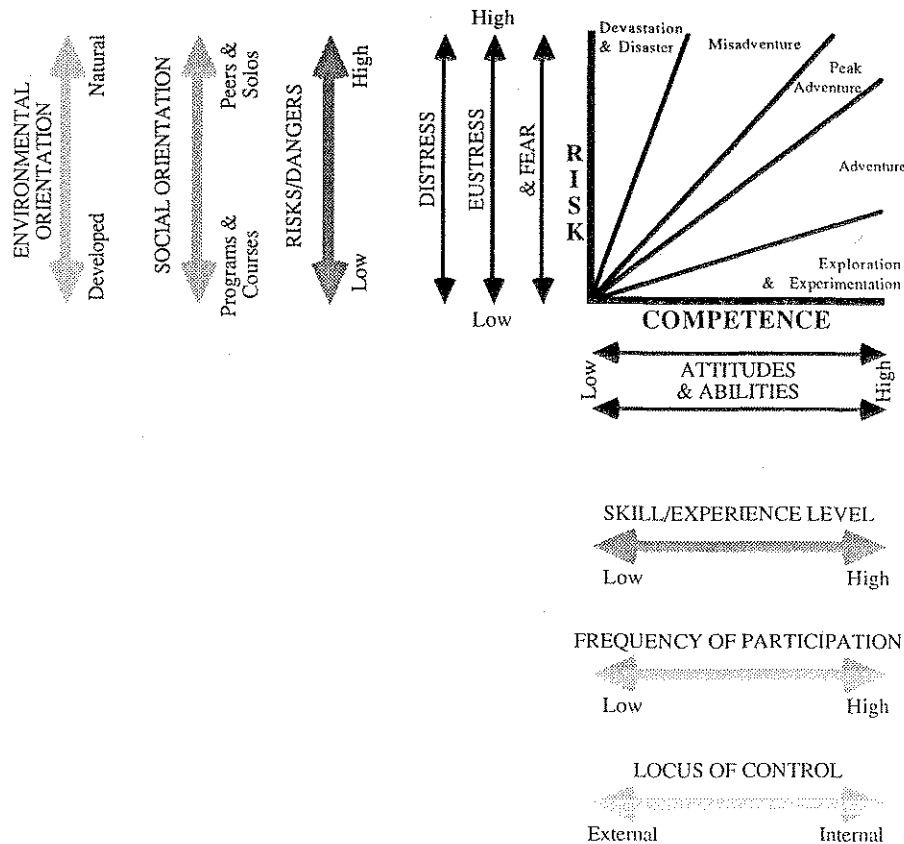


Figure 4: A combination of theories.

structures shift away from family, friends and organized groups. . ." (1989, p. 134).

### Application

Ewert and Hollenhorst's (1989) findings relative to their adventure model fit nicely with the Adventure Experience Paradigm and the findings of this study. The diagram below portrays the arrangement of both theories in concert (Figure 4). The findings of this study related to perceived risk (three factors of fear, eustress and distress) and perceived competence (two factors of attitudes and abilities) are aligned with those of Ewert and Hollenhorst (risk/dangers, social orientation or environmental orientation and skill/experience level, frequency of participation or locus of control, respectively). The two conceptual approaches dovetail nicely.

The utility of the findings from this study will be useful for researchers wishing to apply the DAE to studies of perceived risk and perceived competence in adventure recreation, for practitioners wanting to understand the Adventure Experience Paradigm or what it means relative to their clients, and for resource managers seeking to provide a spectrum of recreational opportunities for the resource user which will accommodate varying levels of risk and competence.

Future research should adopt three foci. First, further testing with the DAE needs to refine the factor structure from a breadth and depth of subjects with varying ages and experiences in different outdoor adventure activities. Second, the DAE should be used to track changes in perceived risk and perceived competence for adventurers engaged in a wide spectrum of outdoor activities. Third, the DAE may prove useful in determining whether repeated adventure experiences contribute to the development of astuteness in individuals classified as "timid and fearful" or "arrogant and fearless."

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Received July 7, 1990

Revision Accepted March 1, 1991