

Motivation and Disinhibition in High Risk Sports: Sensation Seeking and Self-Efficacy

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This study examined the roles of sensation seeking and self-efficacy in explaining extreme and high physical risk taking behavior. Study participants were 20 extreme risk takers chosen from participants in skiing, rock climbing, kayaking, and stunt flying. One control group was comprised of 20 high, but not extreme, risk takers from each of these activities, matched to the participants in skill and experience. A second control group consisted of 20 trained athletes involved in moderate risk sports. Percepts of self-efficacy emerged as the principle variable differentiating the groups. A social cognitive explanation for desire for mastery was used to understand what enables risk takers to overcome the potentially inhibiting influences of anxiety, fear, and the recognition of danger. This conclusion is further reinforced by converging results from interviews with the participants. © 1997 Academic Press

INTRODUCTION

The predominant view reflected in the media is that some degree of risk taking is beneficial and even necessary for the health and survival of the species. Ironically, during the first half of the century physical risk taking was viewed as evidence of pathology (Adler, 1930; Deutsch, 1926; Fenichel, 1939, 1945; Huberman, 1968). Psychoanalytically oriented theorists regarded physical risk taking as counterphobic behavior and expressive of a death wish. Anna Freud reported that in treating high-risk sports participants, the activity typically served the function of allaying anxieties about “masculine inadequacy,” that is to say, “castration fear” (Huberman, 1968). Toward the middle of the century, however, Hebb pointed out that a great num-

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ber of human activities, including such physical pursuits as skydiving and driving cars at high speeds, are motivated by the need to raise an individual's level of stimulation and excitement. Leuba developed the concept of optimal stimulation in 1955 and was later supported by the experimental work of Lilly and Hebb on sensory deprivation (White, 1961).

Concomitant with the theory of optimal sensory stimulation is the concept of sensation seeking, which assumes that susceptibility to lack of arousal, or boredom, varies among individuals and that they will seek differing amounts of stimulation to avoid it. The results of both observation and research have shown that there are differences among individuals in their tolerance of and preference for high levels of stimulation (Farley, 1985, 1986; Feiji, Orlebecke, Gazendam, & Van Zuilen, 1985; Zuckerman, 1974, 1983, 1985). Risk taking is now generally seen to be motivated by sensation seeking and Zuckerman's Sensation Seeking Scale (SSS) and its Thrill and Adventure Seeking (TAS) subscale have been validated as measures of willingness to participate in high arousal sports (Brown, 1978; Cronin, 1991; Goma, 1991; Hymbaugh & Garrett, 1974; Melstrom, Cicola, & Zuckerman, 1976; Rowland, Frankel, & Harrison, 1986; Straub, 1982; Zuckerman, 1983; Zuckerman & Link, 1972).

Factors of Disinhibition

Theories of sensation seeking do not easily explain why it is that people will take risks in one area of their lives and not in others. Left unexplained as well is the role played by the desire for achievement and mastery, two motives often mentioned by risk takers themselves (Balint, 1959; Huberman, 1968; Klausner, 1968). Above all, viewing risk taking as a function of sensation seeking does not account for the factors of disinhibition. How do high risk takers handle the factors we might assume would inhibit nonparticipants, factors such as fear and the cognitive recognition that real danger exists?

It is our contention that we may look to the social learning theory of perceived self-efficacy to fill in the gaps left open by a pure sensation seeking explanation of risk taking. Percepts of self-efficacy operate partially independently of the skills involved and optimal functioning requires both the skills and self-beliefs of efficacy. The kinds of outcomes people anticipate depend to a great extent on their judgments of how well they will be able to perform, and they tend to undertake and perform with assurance in activities they judge themselves capable of handling. They set themselves challenges that hold their interest and they approach threatening tasks nonanxiously. Instead of being disturbed by thoughts concerning their own capabilities, they can direct all effort to the task at hand (Bandura, 1986).

Studies of athletes have found a clear negative relationship between the amount of anxiety and fear involved in an endeavor and the degree of perceived self-efficacy (Bandura, 1986). The theory of self-efficacy is congruent

with findings that, although high sensation seekers do not tend to display lower levels of general anxiety, they do experience less anxiety in specific types of situations. This theory also offers an explanation for the finding that risk takers assess risk as greater in situations in which they have no feeling of control. Finally, the theory of self-efficacy answers our original question, namely, why it is that an individual will display risk taking behavior in one aspect of life and not in others.

Bandura's initial work was concerned with the treatment of phobics, and as such, the theory of perceived self-efficacy from its beginnings dealt with some degree of risk taking. The theory was later applied to nonphobic populations. Although these groups have included some athletes (e.g., tennis players), the theory has never been tested with a group of high physical risk takers.

Relationship between the Theories of Sensation Seeking and Perceived Self-Efficacy

There is general agreement among those in the field of sensation seeking that there is an optimal level of stimulation for the individual, and that this level brings both optimal functioning and optimal affect. This being the case, high sensation seeking individuals would gain a perception of self-efficacy due to their optimal functioning in situations which would not suit those with a lower tolerance for stimulation. Furthermore, high sensation seekers, by exposing themselves to more stimulating situations than low sensation seekers, would have the opportunity, through successful performance, to develop greater perceptions of self-efficacy in those sorts of situations. To a great extent these perceptions would have a realistic basis, in that exposure to the situations under discussion would lead to the development of requisite skills, while avoidance would impede the development of these skills. Bandura has posited that one of the means by which an individual assesses personal self-efficacy is through the level of arousal. Overly high arousal has a negative effect on the perception of self-efficacy. If high sensation seekers have habitually low levels of arousal, as many theorists believe (Farley, 1986), and there is a negative relationship between arousal and self efficacy, as Bandura suggests, it would follow that there is a positive relationship between sensation seeking and percepts of self-efficacy.

Statement of the Problem

In the sensation seeking literature, tests of actual participants in high risk sports have included parachuting (Hymbaugh & Garrett, 1974; Kusyszyn, Steinberg & Eliot, 1974), hang gliding (Brown, 1978; Straub, 1982), skydiving and piloting a glider (Brown, 1978), auto racing (Kusyszyn et al., 1974; Straub, 1982), snowmobiling (Kusyszyn et al., 1974), scuba diving (Heyman & Rose, 1980), skiing (Connolly, 1981), and mountaineering (Cro-

nin, 1990; Fowler, von Knorring & Oreland, 1980). In none of these studies were subjects drawn from as extreme a risk group as has been done in this work. There have been no studies of high risk sports participants in the self-efficacy literature. In fact, the subjects in this study represent an extraordinary sample, rarely, if ever, studied.

This study compared extreme risk takers, high risk takers, and a group of participants invoking lower risk, in four different sports. Participants were assessed on the variables of sensation seeking, physical self-efficacy, general self-efficacy, repression/sensitization, and death anxiety. It was predicted that extreme physical risk takers would exhibit higher sensation seeking scores, higher percepts of physical self-efficacy and general self-efficacy, more repression, and lower death anxiety than high physical risk takers, and that these two groups together would show the same differences compared to the low physical risk group.

In addition to the quantitative data, lengthy structured interviews were conducted to explore further the phenomenon of risk taking and to uncover factors not considered in the original model. There was both a theoretical and a practical purpose for the study. On the one hand, there was the desire to contribute to our understanding of the relationships among risk taking, self-efficacy, and sensation seeking. On the other hand, knowing the dynamics of risk taking behavior might put us in a better position to modify the willingness to take risk, either to increase risk taking behavior when the costs have been overestimated, or to decrease it when the likelihood of harm is significant.

METHOD

Participants

Subjects in this study were male participants in sports activities in which an error on the part of the participant would clearly result in the likelihood of death or major, incapacitating injury. Men were used because of the relatively small numbers of women participants at the extreme levels of the chosen sports. Moreover, the norms on some of the scales used differ between men and women. The reason for studying such extreme risk takers is that, with less risk, an important unintentional variable would likely be the pain threshold of the individual and the degree to which he fears pain.

Participants were drawn from four sports: rock climbing, skiing, piloting a small plane, and white water kayaking. An advantage of the four sports used is that they have an "extreme" high risk end, a level in which most participants, even experienced ones, would not participate because of the obvious danger involved. For rock climbing this consists of "free solo" climbing (climbing without a protective rope). For skiing it is what is commonly called "extreme skiing" (jumping off cliffs onto patches of snow or the skiing of extremely steep, extremely narrow chutes, with prominent rocks). For piloting a small plane it is low altitude aerobatics and closed course low altitude racing. For white water kayaking, the extreme end is running rapids that have been rated as extremely dangerous.

From each of the four extreme sports, five participants were chosen. Five high risk taking controls were chosen from each of the matching conventional sports. In addition, 20 athletes

were selected as lower risk taking controls. Operational definitions of the participants and controls are as follows.

Rock Climbing

Climbs are rated Class 1 through 5, where Class 1 refers to recreational hiking and class 5 (range from 5.0 to 5.14) indicates increasingly difficult terrain in which most climbers use ropes and artificial anchoring devices at the higher ratings and at exposure over 30 feet. The rating of climbs is determined by a combination of pitch and the accessibility and prominence of finger and toe holds. Rock climbing involves the use of irregularities on the face of the rock to provide the purchase from which to move upwards. On a highly rated climb, the rock face is virtually perpendicular and the irregularities are very small.

Free solo climbing designates climbing alone and without the protection of a rope. The rare “free solo climber” is someone who will climb solo to almost the rating he will climb roped (for example, although he might climb 5.13 roped, he might climb as high as 5.11c solo). The high risk participants, on the other hand, will climb above 5.10 roped, but do not climb solo on highly rated climbs. The actual skills required by these two groups would seem to be the same, since one cannot climb 5.10 regularly without being highly accomplished.

Kayaking

White water is similarly rated Grade 1 through 6 by the International River Grading System. Kayakers who regularly negotiate both Grade 5 and Grade 6 white water are a select elite. The vast majority of those with a great deal of experience at Grade 5 do not go on to Grade 6 because of the danger involved, where consequences of a mistake are extremely serious. It is doubtful whether skill is the determining factor between those who do paddle in Grade 6 and those who do not. The participants were chosen from kayakers who regularly negotiate Grade 6 and controls were highly skilled kayakers who regularly paddle in Grade 5 but do not tackle Grade 6.

Skiing

The type of skiing that involves jumps from rocks and corniches into steep couloirs and steep rocky faces is called “extreme skiing.” Although many skiers jump from overhangs, it is the terrain upon which the landing is made that determines whether or not the skiing is truly “extreme.” When asked to define “extreme,” participants have answered: “If you fall you die.” The physical part—whether the jump is made onto a snow field or a patch of snow in a rock field—is the same. The participants were skiers who ski the extreme; controls were very accomplished skiers who do jump off overhangs, but not onto extreme terrain.

Piloting a Small Plane

Two general levels of aerobatics exist, those performed at high altitude and those performed very close to the ground. The maneuvers can be the same, but the degree of danger that exists distinguishes the two. In similar fashion, the racing of closed courses close to the ground can be distinguished from the racing of higher altitude open courses by the degree of danger involved. The participants in this area were pilots who fly low altitude aerobatics and those who race low altitude closed courses, and the controls were skilled pilots in high altitude aerobatics and high altitude open races.

In each of the risk sports listed above, the names of those individuals in the extreme group are generally well known among participants in the sport. In cases where the names of these participants were not known personally, reliable participants active in the sports were contacted

in order to acquire these names. The prospective subjects were then contacted directly and informed that the study involved personality characteristics of participants in various sports.

As with the extreme group in each sport, the individuals who perform at a high, but not extreme level, are generally well known. When the names of such individuals were not known, inquiries were made of reliable regular participants in the sport. The high risk control group was created to minimize significant differences in skill levels between them and the extremes, in order that skill level not contaminate the findings.

A second control group of 20 low risk takers was recruited from a local bowling league, participants at local gyms, competitors in relatively low risk competitions, and from among the generally sports oriented local population. On the whole, highly trained athletes were selected in order to minimize differences pertaining to physical conditioning and sports orientation. A number of the controls compete at national or world class levels. They were matched for age with the participants in the other groups.

Measures

Zuckerman's Sensation Seeking Scale (SSS)

The SSS was developed as a measure of individual differences in optimal stimulation levels and optimal levels of arousal. Form V, used in this study, was developed in 1978 and contains 10 items representing each of four factors: Thrill and Adventure Seeking, Experience Seeking, Disinhibition, and Boredom Susceptibility. Total score is based on the sum of the four factor scores.

Internal reliabilities of the 40 item total score in SSS Form V range from .83 to .86. For individual factors, the ranges for male samples are .77 to .81 (TAS), .61 to .65 (ES), .74 to .78 (DIS), and .57 to .65 (BS) (Zuckerman, 1979). Retest reliabilities for the total scale are .94 after 3 weeks (Zuckerman, 1979). Convergent validity of the SSS has been determined by correlating it with other scales such as Myer's Thrill Seeking scale (.73), Murray's Harm-avoidance scale (−.81 for males), and the three MMPI scales of F, Pd, and Ma (Zuckerman, 1974).

Temper's Death Anxiety Scale

Of the six scales emphasized in the literature for evaluating anxiety about death (Boyar, 1964; Collett & Lester, 1969; Sarnoff & Corsin, 1959; Templer, 1969; Tolor & Reznikoff), only Boyar's Fear of Death Scale and Templer's Death Anxiety Scale (DAS) have been properly validated. Templer's scale is the most carefully developed (Lonetto & Templer, 1984). It consists of 15 items, keyed true/false.

Internal consistency of the DAS has been estimated at .76 and test-retest reliability at .83 over a 3-week interval (Lonetto & Templer, 1983). The DAS correlates .74 with Boyar's Fear of Death Scale (Lonetto & Templer, 1983). It has been used extensively with a variety of populations. Correlations between the DAS and other variables support the validity of the DAS as a measure of death anxiety.

Byrne's Repression-Sensitization Scale

The repressor/sensitizer distinction has been used to differentiate individuals who predominantly avoid threatening stimuli and demonstrate a relatively elevated threshold for emotional material, and those who predominantly approach threatening stimuli and exhibit a relatively lowered threshold (Byrne, 1961). Byrne's R-S Scale consists of 127 items derived from the MMPI. Various studies have found relationships between differential threshold scores and other behavior.

The split-half reliability of the R-S Scale is .94 and test-retest reliability after three months

was found to be .82 (Byrne, Barry, & Nelson, 1963). A series of correlational and experimental findings provide evidence that scores on the test relate to repressive versus sensitizing behavior, including clinical judgment concerning defense mechanisms, selective forgetting, recall tasks, perceptual recognition thresholds for threatening stimuli, awareness of anxiety, physiological response to threat, response to ambiguous stimuli, response to humor, and measure of self-concept (Byrne, 1964).

Sherer's Generalized Self-Efficacy Scale

Generalized self-efficacy scales (Parham, 1982; Sherer *et al.*, 1982; Tipton & Worthington, 1984) have been developed to measure relatively enduring expectations that one can perform competently in a wide range of situations. Sherer's Self-Efficacy Scale has two subscales: A General Self-Efficacy subscale consisting of 17 items and a Social Self-Efficacy subscale consisting of 6 items. Sufficient validity for the subscales has been determined in studies correlating them with other personality measures such as Rosenberg's Self-Esteem Scale, Rotter's Internal-External Control Scale, and Barron's Ego Strength Scale. Many such studies help validate the interpretation of the Self-Efficacy Scale as a measure of expectation of personal ability to both initiate and persist in behavior (Sherer & Adams, 1983). The Cronbach α reliability coefficients for the General and Social subscales are .86 and .71, respectively (Sherer *et al.*, 1982).

Physical Self-Efficacy Scale (PSE-1)

The application of self-efficacy measurement to new domains presents difficulties in that the situational specificity of the measures, as conceptualized by Bandura, requires that they be designed anew in each instance (Bandura, 1986). Following precedence (Moe & Zeiss, 1982; Parham, 1982; Tipton & Worthington, 1984), the major factors comprising the perception of efficacy in the domain under consideration—the taking of physical risk—were first identified. Thereafter, several high and extreme risk takers—none of whom were subsequently included in the study itself—were interviewed regarding what it was that allowed them to take risks. Resultant factors identified were: confidence in one's own judgment, confidence in the ability to handle fear, confidence that no mistake will be made, belief that one can do anything anyone else with like experience can do, confidence that unexpected events can be managed, and confidence that one can do what one sets out to do. These factors are all congruent with Bandura's notions about self-efficacy.

The resultant scale, PSE-1, consists of six questions, each of which is given a confidence rating for three categories of error: those in which the result would be potentially trivial, those in which the results would be potentially harmful, and those in which the result would be potentially fatal. Respondents are asked about their confidence concerning (a) performing, (b) managing fear, (c) avoiding making a mistake, (d) handling whatever anyone else with their experience can handle, (e) dealing with an unexpected event, and (f) accomplishing what they set out to do, all in the context of challenging physical situations, where challenge is defined in terms of physical risk. The rating of confidence is on a scale of 0 to 100, in 10 point increments. The hierarchical arrangement of tasks according to degree of difficulty is consistent with Bandura's approach. The categories allow for three sets of scores, with each subscale measuring confidence in situations in which mistakes are trivial, harmful, or fatal.

The PSE-1, the instrument developed for this study, was examined for internal consistency, convergent validity, and predictive validity with the present sample. Cronbach α s for each subscale indicated correlations of .90 for the Trivial subscale, .89 for the Harmful subscale, .92 for the Fatal subscale, and .91 for the full scale. Pearson correlation coefficients between the total scale and the subscales are as follows: Trivial subscale: $r = .47$; Harmful subscale:

$r = .95$; Fatal subscale: $r = .87$. The Trivial and Harmful subscales correlated .42, the Trivial and Fatal subscales correlated .01, and the Harmful and Fatal subscales correlated .78.

Ryckman's Physical Self-Efficacy Scale (PSE-2)

Ryckman's Physical Self-Efficacy scale is a 22-item instrument designed to measure individual differences in perceived self-competence, as well as confidence in displaying physical skills to others. The measure has two subscales, perceived physical ability (PPA) and physical self-presentation confidence (PSPC), as well as an overall PSE scale. Although face validity is good and so is internal consistency (PPA, .89; PSPC, .69; PSE, .80), PSE-1 is targeted more directly to this study and the particular population involved.

Structured interview. A structured interview was conducted with each participant to supplement the psychometric measures. The interview consisted of 21 questions addressing the motivation for participation in high risk sports, awareness of risk, perceived factors of disinhibition, anticipation of pain, attitude toward death, desire for mastery, need for sense of control, and the relationship between self-efficacy and participation in risk taking.¹

Procedure

Participants in all three groups were tested individually. First, each participant's age and sports history were recorded. Second, the six paper-and-pencil scales were administered in the following order: (1) Sensation Seeking Scale; (2) Death Anxiety Scale; (3) Repression-Sensitization Scale; (4) Sherer's Self-Efficacy Scale; (5) Physical Self-Efficacy Scale-1; (6) Physical Self-Efficacy Scale-2. Finally, the interviews were conducted. The interviews for all participants began with the same questions and then diverged as appropriate.

RESULTS

Table 1 contains the means and standard deviations for each of the three groups on the dependent variables: Zuckerman's Sensation Seeking Scale, Templer's Death Anxiety Scale, Byrne's Repression-Sensitization Scale, Scherer's Self-Efficacy Scale, and two Physical Self-Efficacy Scales. Inter-correlations among the scales are found in Table 2. Table 1 also indicates the available norms for the various tests, as well as t test comparisons between the extreme risk and high risk groups and between the combined extreme and high risk groups and the low risk group. On all variables, a one-way analysis of variance was calculated for the three groups in order to determine a pooled error term which was then used as the denominator of the t tests conducted for each of the hypotheses. An additional set of analyses was conducted using age as a covariate in order to determine whether or not age discrepancies among the three groups was a factor contributing to intergroup differences.

Sensation Seeking

On the Thrill and Adventure Seeking factor of the SSS there was a significant difference ($p = .04$) between the Low risk group and the combined

¹ The list of interview questions can be obtained from the authors.

TABLE 1
Descriptive Statistics for Risk Taking Groups and Norms on Sensation Seeking, Death Anxiety, Repression-Sensitization, and Self-Efficacy

Group	Mean	SD	<i>t</i>
Sensation seeking (SSS)			
Extreme risk (A)	23.20	5.48	$t_{A,B} = .33$
High risk (B)	23.75	5.31	
Low risk (C)	22.85	5.24	$t_{A+B,C} = 48$
Norms (college sample)	21.20	5.30	
Thrill and adventure seeking subscale (TAS)			
Extreme risk (A)	8.75	1.48	$t_{A,B} = .41$
High risk (B)	8.95	1.23	
Low risk (C)	8.10	1.83	$t_{A+B,C} = 1.78^*$
Norms (college sample)	7.80	2.10	
Norms (ages 30–39)	5.70	2.60	
Death anxiety (DAS)			
Extreme risk (A)	5.60	3.10	$t_{A,B} = .73$
High risk (B)	6.30	2.94	
Low risk (C)	6.90	3.00	$t_{A+B,C} = 1.15$
Norms (middle-aged)	6.85	—	
Repression-sensitization (RS)			
Extreme risk (A)	30.55	12.48	$t_{A,B} = 1.26$
High risk (B)	37.00	14.68	
Low risk (C)	41.40	20.44	$t_{A+B,C} = 1.72^*$
Norms (college sample)	42.25	20.10	
General self-efficacy (GSE)			
Extreme risk (A)	69.85	8.90	$t_{A,B} = 1.48$
High risk (B)	65.60	7.49	
Low risk (C)	65.20	10.64	$t_{A+B,C} = 1.01$
Norms (college sample)	64.31	8.58	
Total self-efficacy (SES)			
Extreme risk (A)	90.75	10.51	$t_{A,B} = 1.50$
High risk (B)	85.40	8.55	
Low risk (C)	85.25	14.03	$t_{A+B,C} = .92$
Norms (college sample)	85.51	14.00	
Physical self-efficacy (PSE-1)			
Extreme risk (A)	1676.90	103.15	$t_{A,B} = 2.99^{**}$
High risk (B)	1517.00	171.36	
Low risk (C)	1374.50	214.46	$t_{A+B,C} = 4.78^{***}$
Physical self-efficacy (PSE-2)			
Extreme risk (A)	107.15	11.36	$t_{A,B} = 12$
High risk (B)	105.85	9.61	
Low risk (C)	100.25	13.82	$t_{A+B,C} = 1.95^*$
Norms (mean age = 30.7)	92.72	13.82	

Note. $t_{A,B}$ refers to comparisons between extreme and high risk groups. $t_{A+B,C}$ refers to comparisons between low risk groups and combined extreme and high risk groups.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

TABLE 2

Intercorrelations among the Sensation-Seeking, Death Anxiety, Repression-Sensitization, and Self-Efficacy Scales

	TAS	SSS	DAS	RSS	SES	PSE1	PSE2
TAS	1.00	.60	-.26	-.25	.27	.35	.25
SSS		1.00	-.20	-.06	.17	.19	.04
DAS			1.00	.63	-.41	.46	-.42
RSS				1.00	-.65	.59	-.48
SES					1.00	.48	.57
PSE1						1.00	.39
PSE2							1.00

Note. TAS, Thrill and Adventure Seeking Scale; SSS, Sensation-Seeking Scale; DAS, Death Anxiety Scale; RSS, Repression-Sensitization Scale; SES, Self-Efficacy Scale; PSE1, Physical Self-Efficacy Scale 1; PSE2, Physical Self-Efficacy Scale 2.

Extreme and High risk groups, but no significant difference between the Extreme risk group and the High risk group. On the general factor of the SSS there was no significant difference among the groups.

Physical Self-Efficacy (PSE-1)

On the Trivial subscale of the PSE-1 there was a significant difference between the Low risk group and the combined Extreme and High risk groups ($p = .04$). On the Harmful subscale the Extreme risk group was significantly higher than the High risk group ($p = .003$) and the combined Extreme and High risk groups were significantly higher than the Low risk group ($p = .00005$). On the Fatal subscale the Extreme risk group was significantly higher than the High risk group ($p = .0007$) and the combined Extreme and High risk groups were also significantly higher than the Low risk group ($p = .0002$). The scores of the Extreme risk group on the total PSE-1 were significantly higher than the scores of the High risk group ($p = .002$) and the combined Extreme and High groups were significantly higher than the Low risk group ($p = .00005$).

Physical Self-Efficacy (PSE-2)

There were no significant differences between groups on the Perceived Physical Ability subscale of the PSE-2. On the Physical Self Presentation subscale the combined Extreme and High risk groups were significantly different from the Low risk group ($p = .04$). On the full scale of the PSE-2 the combined Extreme and High risk groups were significantly different from the Low risk group ($p = .03$).

General Self-Efficacy

Differences between scores of Extreme risk takers and High risk takers on the GSE were in the anticipated direction but not statistically significant

($p = .07$). Scores of the Low risk takers were not significantly different from scores of the combined Extreme and High risk groups ($p = .16$). Scores on the full Self-Efficacy Scale (which includes a Social Self-Efficacy factor in addition to General Self-Efficacy) were not significantly different between the Extreme risk takers and the High risk takers ($p = .07$), nor between the combined Extreme and High risk groups and the Low risk group ($p = .18$).

Repression-Sensitization

The scores of the Extreme risk group on the Repression-Sensitization Scale were not significantly different from the scores of the High risk group ($p = .10$). However, there was a significant difference between the combined Extreme and High risk groups and the Low risk group ($p = .04$), indicating greater repression on the part of the higher risk takers.

Death Anxiety

There were no significant differences among the three groups on the Death Anxiety Scale.

Age as Covariate

Ages of the 60 participants ranged from 26 to 70. Mean age for the Extreme risk participants was 38.65 ($SD = 12.79$), for the High risk control group, 37.90 ($SD = 10.48$), and for the Low risk control group, 37.95 ($SD = 8.94$). These modest differences made no change in the level of statistical differences between groups when age was introduced as a covariate in the preceding analyses.

Interview Results

Responses from the interview were analyzed question by question to identify themes across participants. The results of the interviews were congruent with the quantitative findings. One question regarded the element of danger in the participants' sport. Sixty-eight percent of the participants in the higher risk groups, while recognizing the inherent danger, saw it as a "calculated risk." "For me, it is not too dangerous," said one. "For the average person it would be very dangerous, but my experience and technique put me beyond the average." Another, admitting that his sport was potentially extremely dangerous, said that he pictures himself performing, and only proceeds when it feels right. "So it is not that dangerous for me, because then I have a lot of control. I have more control than most." A third answered with a quote from the pilot Chuck Yeager, "I know I'm the number one fighter pilot. If I didn't know that, then I would be a kamikaze pilot."

Another series of questions sought to determine which factors the participant saw as determining the level of risk an individual was willing to take. Answers for high risk takers included differences in the drive to prove one-

self, in willingness to "push it to the limit," in willingness to challenge oneself, and in willingness to be scared, with 50% of the participants specifically naming confidence as the most important factor. "It's how you perceive danger," said one. "It's either thinking of possible problems versus thinking you can do it." "It is the person's psychological make-up," said another. "Whether you're an optimist or pessimist," and that, in turn, he saw as being determined by confidence. "Confidence," said several others. "Confidence in your ability to pull it off every time," said another.

Moderate risk controls responded somewhat differently. Some viewed high riskers as "adrenaline junkies." One said, "The possibility of being killed outweighs the thrill of higher risk for me." However, 55% of the participants from this group too saw degree of confidence as the determining factor. "It's the level of how good you are," said one. "It's how confident you are in your level of skill," said another. "I get over my head and get rattled, but I know others who get up there and stay calm," said a third.

In a series of questions regarding motivation, 85% of the participants in the higher risk groups identified a desire for mastery. "Rising to the challenge," "looking back and saying 'I did it'," "realizing my own potential," "wanting to be my best," "testing my limits," "doing the best I can do," were some answers. When asked specifically, all but three members of both higher risk groups acknowledged that desire for mastery was a motivating factor.

While thrill was identified by 20% of the participants as an additional factor, and in some cases it was the thrill we identify with "thrill seeking," in other cases it seemed to be more of the thrill of having accomplished the feat, or of having done it well.

A third, unexpected motivator that arose in 38% of the interviews was what can best be defined as an aesthetic consideration. "I do it because it is aesthetically beautiful," said one. "It's like an art," said a second. "The aesthetics, the rhythm," said another. A solo climber stated that he did not use ropes because it interfered with the dance-like quality of climbing, while another said that he was motivated by the movement of climbing. A kayaker said, "What motivates me is the state I enter into. There is a real clarity and heightened senses—both physically and of the mind. The risk is completely out of my mind. I am connected and in it. All my senses just feed in."

DISCUSSION

The Role of Self-Efficacy

It can be concluded that the factor most responsible for the disinhibition associated with risk taking appears to be percepts of self-efficacy. This is in keeping with Bandura's (1977) research, which suggests that when people judge themselves capable of handling an activity, they perform with assurance, approach threatening tasks nonanxiously, experience little in the way

of stress reactions, and are able to direct all effort to the task at hand rather than being disturbed by thoughts concerning their own capabilities. Indeed, self-efficacious percepts was the only variable in the study that distinguished between the extreme risk taking participants and the high risk taking controls. Interview data were congruent with scale findings. When asked why the extreme risk subjects took the chances they did while the high risk control group stayed within relatively more conservative situations, 55% of the participants in both groups identified confidence as the most important factor. When questioned about their reasons for taking risk in some areas of their lives and not in others, 68% of the participants across all groups identified the degree of confidence as the deciding factor. Consistent with Bandura's findings, the study participants recognized the physical threat involved in their activities, but did not dwell on possible mishaps. Many used the phrase, "a calculated risk." According to Bandura, performance attainment is the most effective way of developing self-efficacious percepts, and consistent with that, both extreme risk participants and high risk controls described the building of confidence through experience of successful performance as the factor which permitted the taking of physical risk.

Controversy has existed regarding the degree to which percepts of self-efficacy generalize, with Bandura (1977) maintaining that generalization is limited and others (Parham, 1982; Sherer *et al.*, 1982; Tipton & Worthington, 1984) holding that it can be so global as to approach a trait-like characteristic. Results of the study indicate, as Bandura has maintained, that percepts of self-efficacy are to a great extent situationally specific and do not necessarily generalize beyond activities that are similar to the original. The modest correlation (.39) between the physical self-efficacy scale constructed to pertain to the study population (PSE-1) and Ryckman's more general Physical Self-Efficacy Scale (PSE-2) attests to the greater discriminating power of the PSE-1, as well as the situational specificity of self-efficacy. Based on the study findings, physical risk taking is not related to general percepts of self-efficacy and is only related in a limited way to percepts of general physical self-efficacy.

The Role of Repression and Death Anxiety

Results of this study indicate that individuals involved in high risk sports show a greater tendency to repress than do lower risk taking athletes, and comparison with norms drawn from a randomly selected population suggests a tendency toward repression among highly trained athletes in general. Inasmuch as repressors have been found to remember successes better than failures (Eriksen, 1952), and to forget anxiety (Perloe, 1960), we might speculate that repression of possible negative outcomes predisposes an individual to take more risk, and furthermore, that repression of failures, negative feedback, and self doubts enhances percepts of self-efficacy. To some degree,

illusional cognitive processes—unrealistic positive self-evaluations, illusions of control and mastery, and unrealistic optimism—may mediate between repression and perception of self-efficacy, and ultimately lead, as Taylor and Brown (1988) have asserted, to more effective performance.

The study suggests that no basis exists for attributing the disinhibition associated with risk taking to differences in death anxiety. Scale and interview data were congruent on this finding. A further implication of these results is that there is no support for the assertion that risk taking is, in general, counterphobic behavior.

The Role of Sensation Seeking

Surprisingly, study findings were mixed in regard to sensation seeking as motivation for risk taking. The entire sample of highly trained athletes proved to be higher in overall sensation seeking than samples of the general population, and higher, also, on the factors measured by the Thrill and Adventure Seeking, Experience Seeking, Disinhibition, and Boredom Susceptibility subscales. Among the study groups, however, the only difference found was on the Thrill and Adventure Seeking scale between the two higher risk samples and the athletes involved in low risk sports. Examination of the TAS reveals that the constituent questions all involve a willingness to participate in physically challenging, rather “risky” activities, such as mountain climbing, surfboard riding, flying an airplane, parachute jumping, and diving off a high board. To attempt to use a scale containing such items to identify the motivation of participants in these very activities is tautological. The only statement we can make of a high TAS score for athletes involved in high risk activities is that they are willing to do the sorts of things they are doing. Furthermore, since, according to Zuckerman (1974), the Sensation Seeking Scale as a whole is most closely related to the Thrill and Adventure Seeking and Experience Seeking subscales, this needs to be considered when evaluating the significance of the relatively high SSS score for the entire study sample. Viewed thus, perhaps the most noteworthy finding regarding the SSS was the significant difference in ES, DIS and BS scores between the sample as a whole and the general population, inasmuch as these subscales are intended to measure general life-style characteristics of experience seeking, inclination toward disinhibition, and boredom susceptibility. It would seem that trained athletes, as a whole, are higher than the general population in some characteristics of sensation seeking, although high physical risk taking does not seem to be related to the factors.

Another explanation for the lack of significant differences among groups on the Sensation Seeking Scale might be found in scale limitation; that is, if all scores were clustered near the upper limit we might speculate that the scale could not adequately distinguish among the high scorers. However, that was not the case. With a possible total SSS score of 40, 15 of the 20

extreme risk group and 13 of the 20 high risk group scored within the 21–30 range. Only one participant in each group scored within the 31–40 range. The possibility of a ceiling effect is a more persuasive argument for explaining the lack of significant difference between the extreme and high risk groups on the Thrill and Adventure Seeking scale. Nine of the 20 participants in the extreme group and 8 of the participants in the high group achieved the maximal score of 10 on that scale. This suggests that the TAS, and perhaps the entire SSS, having been normed on lower risk takers, may not offer content that validly discriminates among high risk taking athletes.

The rather mixed findings regarding the Sensation Seeking Scale is surprising considering results of other studies of participants in risky physical activities (Cronin, 1991; Zuckerman, 1983; Brown, 1978; Hymbough & Garrett, 1974; Mellstrom, Cicola & Zuckerman, 1976; Zuckerman & Link, 1972). It should be borne in mind that these studies have not included samples drawn from a population of such high risk taking individuals as were included in this work. An exception is a study by Goma (1991), who investigated the personality profiles of mountaneers (climbers and skiers) and alpinists associated with the Spanish Federation of Mountaineering. These high risk takers showed higher scores than non-athlete controls on Sensation Seeking (including the TAS subscale of the SSS), extraversion (measured by the Eysenck Personality Questionnaire), and socialization (measured by the CPI), but not on impulsivity (measured by the Impulsiveness-Venturesomeness-Empathy Questionnaire). Goma's results are consistent with the present findings. His alpinist and mountaineering groups, perhaps comparable to the high risk group in this study, could not be differentiated on the SSS ($M = 24.46$ and $M = 25.37$) and were not significantly different from the "sportsmen" ($M = 23.42$), a control group who engaged in somewhat lower risk sports. Although these groups did differ from non-athlete controls, who were comparable to normative data on the SSS ($M = 18.80$), on the Thrill and Adventure Seeking subscale, only the mountaineers ($M = 8.44$) differed significantly from the lower-risk sportsmen ($M = 7.62$).

Zuckerman (1994) also cites an unpublished study of high risk athletes conducted by Breivik (1991) in Norway. Breivik found that elite climbers, parachutists, and white water canoeists have higher SSS, TAS, and ES scores than students and military recruits, a finding consistent with our own data. A replication study found that a small group of high risk, elite expedition climbers ($N = 10$) had the highest sensation seeking scores of all. A quote from the study, summarizing the perceptions of the climbers, suggests, however, that sensation seeking is not a sufficient explanation for their performance: "Their own evaluations of risk bear out the suggestion that maximizing risk is not the goal of their activities. . . . They think that the objective risk in their sport is high, but not 'very high.' " (Zuckerman, 1994, pp. 164–165). We suggest that perceived self-efficacy may be the variable that criti-

cally differentiates the extreme and high risk athlete from the more moderate risk taker.

The high risk subjects in the great majority of past studies have been participants in activities carrying risk, at most, approximately equal to the controls in the present study. In light of the findings, we might speculate that the Sensation Seeking Scale is not an appropriate measure for the population involved in this study. Certainly the Thrill and Adventure Seeking scale does not appear to be appropriate. As to study results on the general scale and other subscales, we might speculate that extreme levels of physical risk may satisfy general sensation seeking needs and that the individuals might score differently on the various subscales if their needs were not met by their physical activities.

The Role of Mastery and Aesthetics

A few of the participants did mention "thrill" as one of the reasons for participating in their activity. However, thrill was not necessarily defined in terms of sensation seeking; it seemed to relate more to the excitement of having accomplished something difficult, or to more aesthetic considerations. Primary among these motives, identified by extreme risk takers and high risk controls, was the desire for mastery. In prior studies also, the desire for achievement and mastery has been cited as motivation for risk taking. Huberman (1968) found that "achievement and challenge" had a high ranking as a motivator among his subjects. Klausner (1968) noted that, once a challenge was met and a sense of competence achieved by the risk taker, the individual needed to continue on to still a greater capacity in order to further experience the pleasure of effectiveness. Balint (1959), too, found that "stress seekers," as he termed them, were preoccupied with the development of their skills.

A social cognitive explanation for desire for mastery interacts well with the disinhibition findings, and if choice of behavior and effort expended is influenced by the anticipated level of success, then high expectation of success will motivate the behavior strongly. Furthermore, as Bandura (1977) has suggested, once self-reward becomes conditional on attainment of certain levels of behavior, inducements for persistence are maintained. Dissatisfaction created by discrepancies between self-established standards and insufficient performance attainments acts as an additional motivator. When a certain level of performance is established, the individual frequently needs to set still higher attainment levels to achieve the desired self-reward.

Interview results suggest another, unanticipated, motivating factor. This can best be described as an aesthetic consideration. It was expressed in various forms by a number of participants and high risk controls. For some of these individuals it took a kinesthetic form. Climbers spoke of the feeling of movement and the rhythmical pleasure of the experience. Aerobic pilots

spoke of the pleasure and beauty of controlled movement in space. Kayakers expressed their appreciation for the beauty of the natural environment in which their activity took place and the pleasure of intimacy with the rivers, getting to know their various characteristics and idiosyncrasies. Many, in both of the higher risk groups and in all of the sports represented, spoke of the aesthetic beauty of a maneuver done well. Finally, a few of the participants described an altered state of consciousness of the sort termed "flow" by Csikszentmihalyi (1975), and "peak experience" by Maslow (1968), in which attention is focused, time sense is altered, and a feeling of well-being ensues.

It is worth noting that none of the extreme risk participants or high risk controls refused to participate in this study. Among the subjects there was a great deal of enthusiasm about participation. The individuals expressed both an interest in finding out more about their own reasons for involvement in their activities and a desire to further popular understanding of their sports. Among the low risk controls, only one potential subject declined the invitation to participate, expressing suspicion of the field of psychology.

Limitations and Future Considerations

In spite of the fact that this study operationalized levels of risk more clearly than previous research, it became evident in the course of the interviews that some of the participants in the high risk group deviated from the conceptualized ideal control group member. The intention was that the group be comprised of individuals equal to the extreme risk taking subjects in skill and differing from them only in willingness to take risk. However, in actual fact, some of the high risk group expressed a *willingness* to take the risk to which the subjects exposed themselves. For them it was *opportunity* which precluded involvement in the extreme risk activities. This was particularly true of the pilots, some of whom, by self-report, were prevented from participation in low altitude aerobatics by the expense involved in ownership of a plane capable of such maneuvers. It seems likely that, had the three groups been composed of purer types, the differences among them would have been greater on some of the scales.

A major contribution of the present study to the psychological literature derives from its findings regarding the relatively unstudied population of extreme physical risk takers. The study also suggests that, aside from a broad connection between sensation seeking and involvement in sports in general, there appears to be little, if any, relationship between sensation seeking and the choice of an activity carrying a high degree of risk. This finding is incongruent with the theory proposed by those involved in sensation seeking research and calls for explication.

The study adds to the existent literature in several ways. First, it adds self-efficacy to the theory of risk taking. It thereby extends the application of

self-efficacy theory as well. It also provides an exploration of the possible interplay between self-efficacy theory and sensation seeking theory. It points out possible limitations of sensation seeking theory. Finally, it raises the possibility of additional motivating factors for risk taking behavior. Although the present study was limited to physical risk taking, future investigation might explore how these findings apply to risk taking in other areas, such as acts of heroism or decision-making in the corporate world.

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