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CHARACTERISTICS OF PARTICIPANTS
IN HIGH RISK RECREATION:
A STUDY OF PAIN RESPONSE AND SELECTED PERSONALITY TRAITS

By
Deborah Dickison

B.A., Lawrence University, 1973

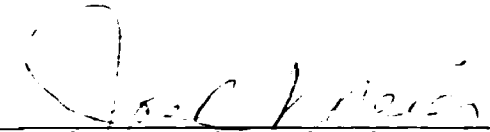
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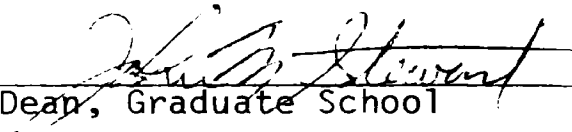
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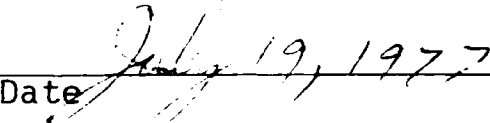
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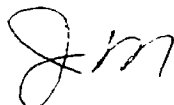
ABSTRACT

Dickison, Deborah, M.S., June, 1977

Recreation

Characteristics of Participants in High Risk Recreation: A Study of Pain Response and Selected Personality Traits (182 p.)

Director: Joel F. Meier



The purpose of this study was to determine if participants in high risk recreation differed from nonparticipants with respect to response to pain, personality traits, reasons for participation in recreation, and perception of risk.

Male students from the University of Montana, Missoula, were used as subjects in this investigation. The Participant group (N=50) was represented by active participants from mountain climbing, ski jumping/racing/acrobatic skiing, hang gliding, skydiving, and white-water boating. The Nonparticipant group (N=50) consisted of those who had never participated in any of the five selected activities and was divided into two subgroups: those who had an interest to participate in risk recreation and those who had no interest to participate in risk recreation.

Four scales from the Personality Research Form provided scores for each subject in Aggression, Change, Exhibition, and Harm-avoidance. Pain threshold and tolerance were measured with gross pressure and muscle ischemia procedures. Data on reasons for participation in recreation, ratings of physical risk, and frequency of participation in forty recreation activities were collected by questionnaire.

Analysis of variance was computed to examine differences 1) between the Participant and Nonparticipant groups; 2) among the Participants in risk recreation, the "With Interest" subgroup of Nonparticipants, and the "No Interest" subgroup of Nonparticipants; and 3) among the participants in the five selected recreation activities.

Results indicated that participants in risk recreation differed from nonparticipants by having higher ischemic pain tolerance, lower scores in Harmavoidance, different reasons for participation in recreation, and in general, lower perceptions of physical risk. In examination of the variables in relation to the Participant group and two subgroups of Nonparticipants, the greatest variance was between the Participants and the "No Interest" subgroup of Nonparticipants. Therefore, it was concluded that the differences were primarily due to the effect of the interest-to-participate variable. The Participant group was a homogeneous group of risk participants. Pain threshold was significantly related to pain tolerance.

ACKNOWLEDGMENTS

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CHAPTER I

INTRODUCTION

Much of the fascination of such exhilarating recreation pursuits as mountain climbing, parachuting, hang gliding, acrobatic skiing, and whitewater boating lies in the skill and daring which the participant must display. In recent years many people have been captivated by this challenge and have become active and devoted enthusiasts of such activities. Little is known about the participants and why it is that they are attracted to these so-called dangerous and high risk activities. Increased participation is most likely not a result of a larger number of high risk personalities, but has been affected by greater opportunities, proliferation of clubs and instructional programs, and improved technical equipment and safety procedures. Why people participate in certain recreation activities is most likely rooted in the physical, psychological, and sociological structure of each individual and the influences of society and culture in general.

Assuming that normal people prefer safety and security, those who choose to turn somersaults in the air with long boards strapped to their feet, jump out of perfectly good airplanes, and scale vertical cliffs with just fingernail holds, are thought to be

suffering from mental aberrations. Often attributed to these people are the pathologies of unconscious death wish, masochism, supermasculinity, and hedonism. Bernard (1968) coined two terms, eustress and dys-stress, to better define the dimension of stress. Eustress is a pleasant type of stress associated with excitement and thrilling experiences, and dys-stress refers to an unpleasant and damaging type of stress. Perhaps since eustress and dys-stress are new concepts, they do not readily fit into current personality theory. Stress seeking is a complex phenomenon and demands a multi-faceted approach in order to understand it.

The theoretical structure in the study of stress is the homeostasis or steady state model, according to Selye (1956). The body is viewed as a system that operates at an equilibrium of dynamic forces. If this equilibrium is upset (e.g., through pain, threat, uncertainty), mechanisms are set in motion to return the system to the original stable state. Leaving this balance is assumed to be unpleasant, and therefore, deliberately leaving the balance for the pleasant experience of disequilibrium as in risk sports is considered by some to be unnatural. Reich (1971) reifies the concept by stating that equilibrium can be reestablished by engaging in activities the individual perceives as appropriate for himself. Stress seeking, then, is individual, specific, and influenced by cultural factors. Far from being abnormal or unhealthy, stress seeking may effect the following: 1) a self-transcendence;

2) an exercise in freedom to counteract the "robot" within humans; 3) an effort to combat apathy; 4) an affirmation of masculinity through a display of courage; 5) an expansion of horizon by pushing back fear (and killing ghosts); 6) enhancement of self-image and self-knowledge; and 7) a representation of revolt against absurdity and death (Reich, 1971:8).

Risk activities are tension generating experiences, and participants as "stimulus addicts" (Ogilvie, 1974) may need this tension found at the outer limits to escape the stresses of everyday living. According to Murray (1938), man makes a continuous effort to reduce the tensions in life which are caused by the needs one feels from within and the pressure of society from without. In order to reduce tension, one may first have to generate it, and through recreation, particularly risk recreation, one may actively seek stress experiences within the acceptable confines of society.

This tension in recreation may be chosen for pleasure, and much of the pleasure lies in the arousal. Arousal may be affected by individual differences in sensory thresholds, with some people possibly requiring greater stimulation or certain modes of stimulation for arousal. Differential responses to stress or tension may also result from threshold or tolerance differences. Thus, the ability to tolerate pain could possibly be related to the type of activity in which a person takes part. For example, if a person does

not feel pain readily, can tolerate a large amount and also possesses certain personality traits, he might be expected to go farther in testing his physical limits through participation in high risk recreation. Therefore, both personality structure and sensory tolerances could possibly exert a strong influence on a person's choice and style of recreation. Certain mental and physical attributes may be characteristic of participants in high risk recreation which enable them to choose and perform in situations involving an element of physical danger and the challenge of uncertainty.

Statement of Problem

The purpose of this study was to determine if participants in high risk recreation differed from nonparticipants with respect to the following variables: 1) response to pain; 2) personality traits; 3) reasons for participation in recreation; and 4) perceptions of risk.

Additional group comparisons were made to analyze the variance. The first comparison involved the Participant group and the two subgroups of Nonparticipants. The two subgroups consisted of those Nonparticipants who had an interest to participate in risk recreation and those who had no interest. A second comparison was made among the participants in the five selected risk activities (mountain climbers, skiers, hang glider pilots, sky divers, and whitewater boaters).

Research Hypotheses

Six hypotheses were examined with the following predictions:

1. There are significant differences between Participants in high risk recreation and Nonparticipants in their pain threshold and tolerance, personality traits, reasons for participation in recreation, and perceptions of risk.
2. There are significant differences among Participants in high risk recreation, Nonparticipants who have an interest to engage in risk recreation, and Nonparticipants who do not have the interest with respect to pain threshold and tolerance, personality traits, reasons for participation in recreation, and perceptions of risk.
3. Within the risk recreation Participant group, there are significant differences among mountain climbers, skiers, hang glider pilots, skydivers, and whitewater boaters with respect to pain tolerance, personality traits, reasons for participation in recreation, and perceptions of risk.
4. There is an inverse relationship between individual skill level in high risk recreation and perception of risk in the selected risk activities.
5. There are significant relationships between the following:
 - a. ischemic pain threshold and tolerance
 - b. gross pressure pain threshold and tolerance

c. pressure pain threshold and ischemic threshold

d. pressure pain tolerance and ischemic tolerance

6. Factors or independent dimensions of recreation activities can be extracted from the reported recreation preferences of the sample subjects.

Definition of Terms

Following are definitions of terms used in this study:

Pain Threshold

Pain threshold was recorded as the length of time or amount of pressure from the beginning of stimulation with the sphygmomanometer to the first report of pain by the subject.

Pain Tolerance

Pain tolerance was recorded as the length of time or amount of pressure from the beginning of stimulation with the sphygmomanometer to the withdrawal from the stimulus by the subject.

Selected Personality Traits

The personality scales from the Personality Research Form (Jackson, 1967) were used to measure the traits of Aggression, Change, Exhibition, and Harmavoidance. Descriptions of these traits are found in Appendix I.

Participant

Subjects in the Participant group participated in one of the selected risk activities at least five times a year.

Nonparticipant "With Interest"

A Nonparticipante "With Interest" was a subject who had never participated in any of the selected risk activities but expressed the interest to do so.

Nonparticipant "No Interest"

A Nonparticipant "No Interest" was a subject who had never participated in any of the selected risk activities and expressed no interest in participating.

Outdoor Recreation

Outdoor recreation included resource-oriented activities which involve human participation as a response to challenge offered primarily by the physical natural world such as hills, air currents, and waves (Progen, 1972).

Selected High Risk Activities

Five outdoor recreation activities were selected as having a high probability of injury or death to the participant through error or failure. The five activities were:

1. mountain climbing - technical climbing using ropes and aids and performed on rock, snow or ice.
2. alpine skiing - specifically, ski jumping (from a standardized ramp), ski racing, or acrobatic skiing

3. hang gliding - gliding with the use of a regulation kite
4. skydiving - sport parachuting involving clear and pull, free fall, or relative work
5. whitewater boating - use of kayak, canoe, or raft on rapids

Delimitations

The subjects in this study included 100 male students at the University of Montana during Fall Quarter, 1976. The fifty subjects in the Participant group were chosen from club members rosters and/or from lists compiled by other known participants. Sampling from university classes, student center classes, and the student directory constituted the Nonparticipant group which consisted of fifty persons. Questioning prior to testing determined if the person met the criterion to become a subject in the Nonparticipant group (See Definition of Terms, page 7). Questioning of the Nonparticipant subjects after testing ascertained their classification into either the "With Interest" or "No Interest" subgroup.

The measurement of personality was limited by the Personality Research Form (Jackson, 1967) and response to pain by the ischemic and pressure pain procedures with a sphygmomanometer cuff. Therefore, generalizations to other studies using different tests must be made with caution.

Limitations

Possible weaknesses of the study were as follows:

Different sampling techniques were used in selecting the subjects for the two groups tested. The names of Participants in risk activities were chosen from compiled lists of known enthusiasts. On the other hand, Nonparticipants were selected from two different sources. Some subjects were volunteers from campus classes, and others were volunteers randomly selected from names found in the student directory.

It was possible that learning or conditioning could have occurred from the first pain test to the second, and therefore, could possibly have affected the results. For example, a successful performance on the first pain test might lower the apprehension about the second pain test, and thus performance could improve on the second test.

In relying on verbal and written responses from the subjects, certain biases about overt behavior may have been introduced. For example, subjects may have responded in socially desirable directions, or there may have been some bias with a female experimenter and male subjects. Attempts were made, however, to avoid these biases by using standardized instructions, procedures, and setting.

Since two methods were used to test response to pain, each test might possibly have produced two different measures. Thus, pain threshold in the arm with one procedure may not be the same as pain threshold in the leg with another procedure. In addition, mechanical difficulties with the test instrument might have biased the results since an inconsistent measure of response to pain could have occurred. (For a more specific analysis of the effects of instrument failure on the results, see Chapter V, Discussion.)

Since the sample size of each of the five risk activity subgroups was small, the conclusions about those subgroups may not be representative.

Significance of the Study

Most empirical research on man's leisure behavior has focused on the relationship between the use of leisure and such demographic variables such as age, sex, socioeconomic status, and occupation. However, both Howard (1976) and Havighurst (1957) concluded from their studies that factors other than demographical variables are

the major determinants of recreation choice. Thus, the present investigation was designed to study the personal characteristics of risk recreation participants in an effort to explore those possible major determinants. Since certain recreational needs may be expressions of certain behavioral needs, then involvement in particular recreation activities might be related to an individual's personality. Although this relationship has long been proposed, few studies of this nature in recreation have been undertaken.

The present study dealt with a particular segment of leisure time pursuits, that of high risk outdoor recreation activities. Risk recreation has become a major concern to professionals for two reasons. First, the roles of recreation and risk in society have changed. As society has shifted from a work orientation toward greater involvement in leisure, recreation pursuits have come to serve as an important basis for differences between people. Similarly, as society has changed, the focus of risk has been altered. For example, in earlier cultures man took part in intense risk-action in the course of survival. That risk-action in terms of survival in the more advanced industrial societies of today is obsolete. Yet, the quest for excitement by people persists. According to Elias and Dunning (1970), in societies in which the burden of danger has been controlled and threatening types of excitement have diminished, a special class of leisure activities has evolved to serve the compensatory function

of play-excitement. The shift of emphasis in risk has allowed people to enjoy, tolerate, and seek stress through self-imposed obstacles, testing of one's limits, and tempting of fear. These obstacles are now self-imposed and are no longer imposed by society. The special class of leisure activities that has evolved includes particularly risk recreation and has attracted numerous devotees in recent years.

A second concern to recreation professionals involves the question of legal liability in risk recreation programming. A number of recreation departments have been crippled by large damage suits for injuries to participants. In one study, those agencies that perceived the risk in certain activities as extraordinarily high also reported the greatest number of legal problems with the activities and expressed the least desirability to provide the activities to the public (Dunn and Gulbis, 1976).

The trend in too many recreation programs, according to Naylor (1975), has been to avoid liability suits by making activities so safe for the participants that much of the risk, excitement, and fun has been eliminated. Naylor registered the following indictment: "In an effort to protect children, public departments have tried to make excitement and challenge out of 'honey and milk toast' activities" (1975:18). Thus, the departments are not meeting the needs of people, and the people are forced to seek excitement and recreation elsewhere.

Studies of eustress seeking, according to Bernard (1968) and Falk (1968), provide support for curriculum changes in recreation programs and physical education. Such studies would assist in understanding the recreation participant, outlining opportunities and programs, providing leadership, teaching skills, and designing safety procedures. Additional research is needed to determine what personal characteristics influence one's choice of leisure time expression.

The significance of examining both personality traits and sensory tolerances in eustress seeking was that relationships between psychological constructs and domains of behavior were further established. Insight into leisure behavior was also gained, particularly into that of the risk recreation participant. The participants in the selected high risk outdoor recreation activities offered a viable sample to study the eustress seeking phenomenon as it occurs in society today.

CHAPTER II

REVIEW OF LITERATURE

While many articles of a philosophical note have been written or why people climb mountains, trust their fates to air currents, or travel the wild rivers, little empirical research has been done in the area of risk recreation. However, the personality and physiological correlates of physical ability have long interested researchers. In an attempt to identify an "athletic" type or general pattern of characteristics of participants in certain activities, personality traits of numerous groups have been compared. Many classifications, such as athletes versus nonathletes, sports participants versus nonparticipants, and intercollegiate versus intramural sports participants have been examined using a variety of test instruments. Although the relationships of personal characteristics and performance have been extensively researched in the last twenty years, there are still uncertainties and contradictions as to the conclusions. Partially this is due to the variety of test instruments used, the broad range of definitions of the groups, the size of the sample, and the nature of the culture from which the subjects were sampled.

For purposes of this review, studies on recreation, sport, and physical activity have been included. The review is divided into three sections: 1) the statistical definition of high risk in recreation; 2) supporting theories of the eustress seeking phenomenon; and 3) experimental studies reviewing the relationships between personality, response to pain, and participation in physical activity.

Statistical Definition of High Risk in Recreation

An attempt was made to quantify the risk in the five activities of mountaineering, skiing, hang gliding, skydiving, and whitewater boating by gathering accident and fatality statistics for each of the activities. Shortcomings were apparent in the data because there was found to be no central agency responsible for comprehensive collection of such statistics. Hartline and Hartline (1976) noted that the reports often come from sources other than those people directly involved in a mishap and may be collected from newspaper articles, corners' reports, word-of-mouth incidents, or published accounts in membership journals.

Another problem in gathering statistics is the problem of definitions. Each year several parachutists are killed when they land in a lake, become tangled in their lines, and drown. Death may actually be due to drowning, but the fatality is dually listed with the United States Parachuting Association. Public health agencies

often encompass mortality statistics into broad categories such as "recreation accident" or "unspecified." According to American Whitewater (Troste, 1974), a difficulty in definition is encountered dependent upon the report of the viewer of a boating accident. If a boating victim is last seen with a paddle in his hand, his death may be classified as a small-craft accident. Those statistics usually fall under the concern of a state agency legally charged with the responsibility in that area. However, in the case of no paddle, the fatality may be classified along with drowned swimmers, waders, and fishermen.

An obstacle in equating accident and fatality statistics in various activities stems from the variety of ways in which the data have been recorded; for example, accidents per number of participants, accidents per number of exposures, accidents per period of time, and by case history. Thus, there is no basis for comparison among total number of participants, accidents per number of exposures, relative length of exposures, and accidents per constant unit of time. Also, comparisons of injury rates over time are tenuous because of altered performing styles, designs of equipment, and greater exposure to the accident situation through increased numbers of participants. Finally, the correlation of age, sex, skill, years of experience, time of day of accident, and other variables is obscured by the lack of control data (Earle et al., 1962).

The number of accidents reported is probably far below the actual number occurring in each activity. The American Alpine Club (1976) stated that fewer cases were reported in recent years because of a growing concern about legal implications.

Accidents are the fourth leading cause of death in the United States with a death rate (1973) of 55.2 per 100,000 population at risk (Statistical Abstracts, 1976). A more specific breakdown by sex and age is a 110 per 100,000 death by accident rate for males 15-24 years old and 78 per 100,000 for males 25-44 years. These accident rates include all types of accidents, however, and are not just those that occur in recreation. One estimate in 1972 indicated that 17 million Americans were injured while taking part in sports, either professional or amateur (Newsweek, 1973).

Accident figures for activities higher than those published in Statistical Abstracts are considered high risk by some insurance companies. Therefore, such companies raise the cost of the insurance premium for individuals who participate in those activities. According to several insurance companies (Metropolitan Life Insurance Company, Safco Insurance Company), the most frequently asked question about sports participation on an insurance form is for activities of sky-diving, scuba diving, and auto racing. Lower insurance rates are given to those individuals with more experience (skill reduces risk) and to those with a history of fewer accidents.

The evaluation of high risk in recreation, for the most part, is determined on a subjective basis. The objective risk, or actual probability of success, may be low (i.e., if the probability of success is high, the objective risk is low), but people may perceive the risk of the activity as high for subjective reasons. For example, the 1974 death rate for sport parachuting was one death per 34,000 jumps (Hughes, 1976), a low figure of objective risk. Skydiving can be classified, though, as high risk because in the event of an accident, the probability that it will be fatal is extremely high. Thus, the subjective value placed on the consequences of the accident, the "stakes," imbue the activity with risk. In comparison, the objective risk for skiing is much higher, estimated from 3.8 to 10.3 injuries per 1000 skiing days (Ferris, 1963). The subjective risk is lower, however, because fatalities are fewer. This suggests that the uncertainty of the outcome and the nature of the consequences for failure do not necessarily make an equal contribution to the assessment of risk.

The subjective value of high risk in the selected outdoor recreation activities has also been fostered by the media. On one television sports show, the "agony of defeat" is associated with a ski jumper sliding out of control down a ramp. Titles of magazine articles lend credence to the belief that not only are the selected recreation activities high in risk, but that the participants are somehow abnormal for

voluntarily seeking those risks; for example, "Mountaineers: Dilettants of Suicide" (Cort, 1963): "Mountaineering: Fatal Madness" (Newsweek, 1962): "Ski Freaks: Hotdogging" (Newsweek, 1974): "I Like to Risk My Life" (Alvarez, 1967).

Supporting Theories of Stress Seeking

Five theories are discussed to explain stress seeking or risk taking and its relationship to participation in recreation. These theories are risk exercise, optimum level of stimulation, perceptual characteristics of stress seekers, personality correlates of response to pain, and personality correlates of risk taking.

Risk Exercise

In the theory of risk exercise, Rosenthal proposed that there is a chemical element involved in the unusual exhilaration experienced by participants in risk-action sports (Furlong, 1967). In an effort to determine what groups of people were most likely to share this high level elation, Rosenthal concluded that it was descriptive solely of those engaged in high risk sports. A difference was noted between the response to the completion of a tennis game with feelings of fatigue, satisfaction, desire to relax and the feelings after risk exercise of euphoria, exhilaration, and addictive desire to repeat the experience.

The primary source of the high lift or "rush" from risk exercise, according to Rosenthal, is rooted in the culture of man. Since it is no longer appropriate to engage in risk-action in the course of survival, the "civilized" person finds an outlet for this special need for excitement in risk sports. Furthermore, he suggested that the large number of participants involved in risk activities in recent years may reflect a measure of the conflicts within society and within an individual. Thus, the fundamental proposition of risk exercise is that calculated risk on both a mental and physical basis is necessary for daily well-being.

The competence of the individual and difficulty of the task affect the risk involved and the amount of exhilaration generated. While the novice can take risks within his own level of competence, he rarely achieves the high level of sensation that the well-skilled individual reaches. In support of this contention, Rosenthal designed a questionnaire exploring the reactions to risk exercise. From 98 replies received from all over the world and representing 33 risk sports (e.g., bull fighting, mountain climbing, skydiving, fox hunting), 67 reported this euphoric state in connection with participation, and 68 reported themselves as above average to expert in their fields. This euphoric feeling, theorized Rosenthal, is free from any degree of doubt or fear. He concluded that there is evidence of the existence of this exhilaration process and that it occurs

specifically in response to risk-action. Additional research is needed to determine the mechanisms, both chemical and psychological, involved in the process.

Optimum Level of Stimulation and Arousal Seeking

Fiske and Maddi (1961) proposed that the core tendency within a person's personality is the attempt to maintain an optimal level of stimulation characteristic of him. This optimal level of stimulation, according to Leuba (1955), is subject to variation depending on the meaningfulness of the stimulus to the subject and the amount of change or unexpectedness involved. Since pleasure is associated with movement toward an optimal level, learning occurs in response to the experience. This, in turn, may affect approach and avoidance behavior of an individual in a particular situation. If a person is constantly seeking some optimal level of internal excitement, risk might be courted in order to raise the amount of excitation when it drops below the optimal level and avoided when the excitation level becomes excessive (Berlyne, 1966).

A relationship probably exists between risk taking and autonomic stimulation in that the emotions of hope and fear are aroused through presentation of certain stimuli. Thus, emotional arousal may be a prerequisite for excitation of risk taking propensities. Hardman (1973) suggested that individual differences in threshold levels at which stimulation occurs may effect differential responses in arousal.

An individual's characteristic autonomic responsiveness, therefore, could influence the way in which subjective probability of success and failure interact with subjective utility of outcome to produce the sensation of fear. The research to determine the relationship between the fear response and perceived risk and decision making is yet at a preliminary stage.

While there is plentiful evidence on the importance of reducing excessive levels of tension (unpleasant stress), only recently has evidence been presented to demonstrate that some individuals strive to raise their tension levels through eustress seeking. Hebb and Thompson (1968) maintain that dangerous sports represent a basic need to raise the level of stimulation or excitement and that solving problems and pursuing mild risks are inherently rewarding. The arousal seeking model, then, can explain the mechanism that motivates people to engage in stress seeking play (Ellis, 1972).

Perceptual Characteristics of Stress Seekers

Perception, the process by which an organism receives and analyzes sensory information, may have implications for stress seeking behavior in recreation choice. Petrie et al. (1960) proposed that the orientation of the perceptual system of each individual may influence one's optimum level of arousal, reaction to stress, and tolerance for stimulation. Furthermore, they suggested that perceptual characteristics are the cause of certain types of personality and

behavior. While some individuals will constantly tend to reduce the intensity of their perceptions, others possess the opposite tendency, namely to augment the intensity. Thus, the reducer tends to be more tolerant of pain, less tolerant of sensory deprivation, more extroverted, and more likely to give a slow assessment in the passing of time. On the other hand, the augments tends to possess characteristics of an opposite nature. If the reducer suffers from lack of stimulation, then the need to seek additional stimulation through movement, change, speed, or other sensory input would be greater (Petrie et al., 1963). Thus, the attraction of stressful physical activities might also be greater.

The characteristics of the perceptual reducer have frequently been associated with athletic groups. Two studies by Ryan (1966, 1967) demonstrated that participation in certain types of sports might be related to perception and tolerance of pain. In the first experiment (Ryan and Kovacic, 1966) it was found that contact sport athletes tolerated the greatest amount of pain, nonathletes endured the least, and athletes in noncontact sports were in between. In the second experiment (Ryan and Foster, 1967), the hypothesis was tested that contact sport participants would reflect the perceptual pattern of the reducer and nonparticipants would have the characteristics of the augments. Those that participated actively in contact sports were found to tolerate more pain, underestimate the passing of time, and reduce the estimation of kinesthetically perceived size.

Thus, the hypotheses of both Ryan and Petrie were upheld that perceptual patterns do exist among individuals. Ryan further concluded that how one perceives sensory input is related to the type of physical activity in which a person chooses to participate.

Personality Correlates of Response to Pain

Both Kane (1971) and Eysenck (1967) proposed that personality and response to pain are linked through the traits of extroversion-introversion and neuroticism. Since the extroverted person is more likely to have a high arousal threshold and a tolerance for pain, the extrovert has been identified with the perceptual reducer. The more introverted person with a low arousal threshold is more likely to perceive pain quickly. Therefore, since the introvert appears to augment the intensity of the stimuli, he is associated with the perceptual augmenter. Because the reducer (extrovert) tends to inhibit sensory input, he may need additional sensory stimulation to maintain his optimum level of arousal. Reducers have been found to more likely seek artificial means of stimulation such as drugs and cigarettes, enjoy loud music, and prefer bright colors (Eysenck, 1967). Likewise, extroverts have been characterized by a greater orientation for action while introverts were found to be more passive and adhere more closely to instructions (Tranel, 1962).

In a study by Lynn and Eysenck (1961), heat stimulation was used as a measure of pain tolerance and the Maudsley Personality Inventory

as a measure of extroversion-introversion and neuroticism. Significant correlations were found between personality and pain tolerance in the female subjects such that high pain tolerance was related to extroversion and low neuroticism. Thus, Petrie's theory of reducers was equated with Eysenck's measure of extroversion by experimental evidence.

Other studies have not found a clear relationship between personality and pain tolerance measures. Davidson and McDougall (1969) used both cold-pressor and thermal pain techniques to measure pain tolerance of female subjects. Neither extroversion nor neuroticism (Maudsley Personality Inventory) was significantly related to either measure of pain tolerance.

Brown et al. (1973) found that responsiveness to pain was not related to any of four personality measures: anxiety, neuroticism, extroversion, and sensation seeking. The experiment employed two types of pain-producing stimuli (cold and pressure) and three personality measures: Multiple Affect Adjective Check List (anxiety), Maudsley Personality Inventory (extroversion, neuroticism), and the Sensation Seeking Scale (sensation seeking). They concluded that the correlations between pain response and the selected personality traits may have been small due to a number of unconsidered variables such as the kind of pain-producing stimulation used, sample size, other personality traits, and type of personality measures used.

Evidence for a relationship between pain response and personality has been demonstrated by surgical studies. Petrie and associates (1958) reported that prefrontal lobotomies were performed on patients to relieve suffering from severe pain. Changes noted were increased pain tolerance, decreased tolerance of sensory deprivation, and greater extroversion. Thus, the source of pain and pain threshold had not been altered but the person experiencing the pain had.

In summary, evidence exists that people may behave the way they do because of their personality, perceptual, or pain response characteristics. A certain amount of stimulus hunger is postulated to exist in the extrovert (Eysenck, 1967). On the other hand, a certain degree of stimulus aversion is thought to occur in the introvert. Extroversion has been related to the perceptual reducing of stimuli and a tolerance of pain. All these characteristics may correspond to stress seeking or arousal. Thus, the type of recreation pursuit may be related to behavioral traits as well as to pain response.

Personality Correlates of Risk Taking

High risk taking has been identified as a characteristic of participants of stressful activities, and risk taking has been positively correlated with personality traits. If one follows the association, it can then be expected that participants of risk

recreation would have certain personality features. Thus, the personality correlates of risk taking have implications for the description of personal characteristics of the risk recreation participant.

A risk taking construct has been incorporated into the theory of achievement motivation propounded by McClelland et al. (1953). They propose that the motivation strength in any action situation is a multiplicative function of motive strength, probability of attainment, and the value of that attainment (incentive). Incentive is thought to be inversely related to subjective probability of success in that if a task is quite easy (high subjective value of success), it should have a low incentive value. Moreover, people should experience the greatest displeasure when they fail at an easy task and derive little gratification from solving an easy problem.

Two motives have been theorized to be operant in any achievement, risk taking situation. One is the motive or tendency to approach success and the other is the tendency to avoid failure. Given the multiplicative functions of motive strength, the person in whom the motive to achieve success is stronger would be expected to choose tasks of moderate difficulty. Tasks at this level afford the highest incentive while balancing the probabilities of success and failure. On the other hand, a person who is more strongly motivated to avoid failure would be expected to exhibit either extreme risk taking or conservatism by avoiding moderate risks and opting for

tasks that are either very easy or very difficult. In such tasks, anxiety is minimized by avoiding closely balanced probabilities of success and failure.

Another theory, that of self-testing, links personal characteristics with a risk propensity in an individual. Self-testing is a mode of action in which a person willingly tests his competence at meeting the demands of a particular environment (Roberts and Wicke, 1971). In each self-testing situation, the participant chooses his level of self-testing. That is, he determines the degree to which he is willing to risk failure. Self-testing situations are abundant in forms of expressive travel so most studies have been done with such activities. The relation of expressive self-testing in driving a car and attitudes of sociability, self-importance, and achievement has been demonstrated (Roberts et al., 1966). Patterns of attitudes of self-testers have also been explored with naval fliers and traffic controllers. These patterns included willingness to take high physical risk, preference for maintenance of social distance, preference for games of chance, tendency to stretch regulations, enjoyment of speed in driving, and high achievement motivation (Roberts and Wicke, 1971; Roberts et al., 1972). Low self-testers scored opposite from the high self-testers on these attitude variables. Furthermore, these high self-testers may be similar to Petrie's perceptual reducers in that in response to pictures of wrecked cars, the self-testers were more likely to give lower estimates of damage,

reduce the amount of carelessness due to the driver, and adhere less strictly to regulations.

Cameron and Meyers (1966) investigated a relationship between personality variables as measured by the Edwards Personal Preference Schedule and a propensity for risk taking in a gambling situation. Subjects high in exhibition, aggression, and dominance preferred situations with low probability of winning but high payoff. Subjects high in autonomy and endurance preferred bets with high probability of winning and low payoff. Furthermore, all subjects tended toward higher bets in tasks with imaginary payoff and lower bets in situations with real payoff conditions.

Knowles and associates (1973) used multivariate analysis to determine the convergent validity of thirteen risk-related measures. Although a general convergence was not found, a motivational trait was isolated and interpreted as identifying a person's general willingness to approach or avoid risk situations. Conclusions were that consistencies in risk behavior do occur across a variety of situations.

Weinstein and Martin (1969) found that the willingness to take material risks most likely generalizes to the sphere of interpersonal relations as well. However, the magnitude of the relationship was small, which may have been a reflection of heavy influences of situational factors in willingness to take interpersonal risks. Also, the personality traits of extroversion and Machiavellianism were

found to be most strongly related to material risk taking.

In a study with a number of attitudinal and behavioral variables, Williams (1965) found that those people with a propensity toward risk-taking were more favorable in attitude toward change in job activities, more likely to change jobs, and more likely to see intrinsic values in a job.

Using the Forced Choice Questionnaire and Maudsley Personality Inventory, Rim (1964) found that subjects who scored highly on the extroversion scale were more likely to have a higher propensity for risk taking.

Kogan and Wallach (1967) argued against an organismic or personality construct of risk taking. If such a general disposition existed, it could be predicted that people would treat diverse situations in a consistently risky or conservative manner. Based on information in their 1964 study, they concluded that while not all people can be appropriately described as risk takers or conservatives in a general sense, particular kinds of people can be described as such. Thus, those high in test anxiety and defensiveness are more consistent in risk taking across situational and task variations. The concern with image maintenance (defensiveness) and fear of failure (anxiety) eventuate in a dominance of motivational over cognitive considerations in determination of their risk taking behavior.

Much of the controversy of a risk taking construct concerns the overlap of two psychological domains. In the decision-making

paradigm, objectively stated or readily inferred probabilities and incentive values are involved. Thus, risk taking is explicit. However, in cognitive-judgmental situations (e.g., confidence of judgment) in which uncertainties and incentives are present in some degree but not in a clear or salient role, risk taking is implicit. Little evidence has been presented to demonstrate a relationship between attitudes toward risk and cognitive-judgmental variables and risk taking in decision-making situations (Kogan and Wallach, 1964). The complexity of behavior in a variety of situational and task considerations, then, makes difficult a concise risk conceptualization.

Experimental Studies

A general finding of studies in the area of personality characteristics and pursuits of physical activity indicates that the manner and extent of participation in recreation or sports is partially a function of personality (Copper, 1969; Lamphear, 1970; Flanagan, 1951). However, findings regarding specific characteristics are varied.

Martin and Myrick (1976) investigated personality factors in relation to participants (N=374 males) in three active leisure pursuits--skydiving, scuba diving, and snow skiing. The control group consisted of 302 male business majors. Using the Veldman-Parker personality instrument and multivariant discriminant analysis, the results indicated that the personality trait scores of skydivers,

skiers, and scuba divers were grouped relatively close together while those of the normative group were distant. The participants in the active leisure pursuits were more likely to describe themselves as socially abrasive and self-confident. The normative group, on the other hand, was characterized by more conventional social behavior and more irritable behavior.

Howard (1976) also used multivariate analysis to extract independent dimensions of leisure activity and to examine a relationship between personality variables and recreation preferences. The Leisure Activity Questionnaire and the Personality Research Form were administered to male and female high school students. Four factors of leisure activity were identified as Outdoor-Nature, Sports, Aesthetic-Sophisticate, and Leisure Detachment. When the factor scores were correlated with personality trait scores, results indicated that those people scoring highly on the Outdoor-Nature dimension exhibited significant correlations with Endurance, Autonomy, Dominance, Understanding, and rejection of Harmavoidance. Those with high scores on the Sports factor scored highly in Aggression, Impulsivity, Play, Order, Understanding, and rejection of Nurturance. Individuals who scored highly on the Aesthetic-Sophisticate dimension displayed significant correlations with the personality variables of Exhibition, Dominance, Affiliation, and rejection of Aggression. Lastly, those in the final factor of Leisure Detachment showed

negative correlations with Exhibition and Understanding. Howard (1976) concluded that personality variables and leisure preferences were significantly related. In addition, the predictive powers of leisure activity preferences from personality profiles were markedly increased.

In an investigation to find out what type of people voluntarily select physically risk activities for enjoyment, Huberman (1969) concluded that risky activity participants were mentally healthy specimens and not in possession of counterphobic anxieties. Using a variety of test instruments (Boyar's Fear-of-Death Scale, Cattell's High School Personality Questionnaire, Murray's Thematic Apperception Test, Blum's Blacky Card #6, Gough's Adjective Check List, and several attitude scales developed for the study), findings revealed that risk had motivational qualities and risk seekers tended to come from homes in which risk taking was reinforced. Personalities (measured by Gough's ACL) of all groups in contrast to population norms were significantly higher in achievement, dominance, endurance, and low in succorance. The risk seekers showed significantly low heterosexual interests, possibly an influence of cultural sex roles.

Delk (1971) proposed that the pleasure in skydiving follows the tension-reduction postulate well known in psychology. According to the postulate, a decrease in above-normal tension leads to a pleasurable state. Skydivers, then, are involved in a self-induced

tension, the resolve of which brings pleasure to the individual. The Shipley Vocabulary Test and Minnesota Multiphasic Personality Inventory were administered to a group of skydivers. Results indicated that the skydivers were within the top ten percent of the general population in terms of intelligence. In comparison to population norms, skydivers were relatively free from anxieties and health worries and displayed openness, positivism, anti-conventional behavior, orientation toward action, sociableness, and thrill-seeking.

Hymbaugh and Garrett (1974) administered the Zuckerman Sensation Seeking Scale (based on the construct of optimal stimulation) to skydivers and nonskydivers matched on age, sex, and socioeconomic variables. Scores for skydivers were significantly higher than the nonskydivers indicating that skydivers demonstrated a greater degree of exhibitionistic and unconventional behavior. The researchers concluded that skydiving could be characterized as a sensational, high risk activity.

In a study with participants in special leisure interest groups (including hikers and river rafters) and the Edwards Personal Preference Schedule, O'Connor (1971) found that a relationship existed between personality need and choice of leisure pursuit. Furthermore, there were differences between the personalities of participants in special interest groups and the general population. River rafters were found to score higher in achievement, exhibition, dominance, change, aggression, and heterosexuality.

Ogilvie (1974) described those who choose risk sports as desiring recognition and rebelling against routine. Such participants also scored high in autonomy, dominance, and emotional stability and low in anxiety. They also exhibited a "need for extending themselves to absolute physical, emotional, and intellectual limits in order to escape the tensionless state of everyday living" (1974:88). The psychological factors, essential to athletic success, Ogilvie and Tutko (1971) concluded based on studies of athletes with the 16 Personality Factor, Personality Research Form, and Edwards Personal Preference Schedule were persistence, ability to withstand pain, dominance, achievement, and aggression.

Brunner (1969) investigated personality and motivating factors influencing participation in vigorous physical activity by adult males. Using Gough's Adjective Check List, the study found that the Participant group scored higher on Intraception, Number of Favorable Adjectives Checked, Defensiveness, Achievement, Dominance, and Self-Confidence. The Nonparticipant group scored higher on Succorance and Counseling Readiness. The Participant group also indicated many more benefits of physical exercise than did the Nonparticipant group.

Fletcher (1971) found a relationship between personality and participation in intramural activities. Participants in intramurals were found to score higher on the Edwards Personal Preference Schedule

traits of Order, Affiliation, Dominance, and Heterosexuality. This group scored lower on Achievement and Autonomy as compared to the Nonparticipants in intramural activities.

In a study to determine differences in personality between those recreationally inclined and those not so inclined, Ibrahim (1969) concluded that there was not enough evidence to support the premise. Using the California Personality Inventory he further concluded that differences in personality among participants in certain clusters of recreation activities did not exist. Thus, factors other than personality influence one's inclination for recreation or for a particular type of activity.

Cattell (1965) viewed high scores on factors of ego strength, dominance, and parmia to be important in athletes. Dominance would help the individual in heightening competitive motivation while ego strength would aid in tolerance of tense moments. The parmic temperament might be displayed by the individual as an autonomic toughness or resistance to threat or fright. Such personality attributes might also be helpful to the participant in risk recreation.

Based on studies by Booth (1958), Slusher (1964), Whiting and Stenbridge (1965), and others, Warburton and Kane (1966) concluded that extroversion was characteristic of all the sample athletes. However, since extroversion is influenced by five trait scores, some of the variability among the athletes may be accounted for by the

variability in the trait scores. Thus, Warburton and Kane (1966) hypothesized that the association between extroversion and physical ability was dependent upon the level of ability of the individual such that the selection process favors traits of extroversion at lower levels of competition while in the process of becoming a champion the individual is conditioned toward introversion. In addition, the researchers postulated that anxiety might be related to the type of competitive stress. This was based on the finding that more experienced competitors were characterized by emotional stability while anxiety was more common in lower level competitors.

Vanek and Cratty (1970) proposed that only individuals with certain personality characteristics can undergo the stress of participation in particular types of activities. They suggested that the component of risk might be the attraction to the participants in a variety of risky sports. Thus, a number of classification schemes include such a category. Vanek and Cratty (1970) have a category including physical activities in which injury or death is imminent; Callois (1961) and Kenyon (1968) have a Vertigo category; McIntosh (1963) has a classification of activities which are a challenge by the environment or situation; and Berger (1970) classified activities on the basis of probability of physical harm.

Pain Response Characteristics of Physical Activity Groups

A review of the literature of pain reveals that pain is a

subjective phenomenon, the evaluation of the pain experience is difficult, and there are marked differences in pain tolerance, and the relationship between pain threshold and tolerance is inconsistent.

Although two components of pain have been proposed (Beecher, 1957), a great degree of overlap between the two components has been found. This has been reflected in variable results in measurement of the pain experience. The original sensation is considered to be the physiological component while the reaction to pain is psychological in nature. However, although the sensation of pain is dependent upon a functioning nervous system, it also involves perception, a psychological factor. The reaction to pain, on the other hand, is constituted by what the individual feels, thinks, or does about the pain. Thus, discrimination, memory, and judgment enter into the reaction process. In addition, structural differences in the nervous system, past experiences, and situational factors affect the individual's response to pain.

According to Sternbach (1968), each person experiences pain in a unique way. The individual may feel the stimulus differently and/or react to it differently than any other person. However, since the pain response is not directly communicable, measurement must rely on the transmission of behavior from the subject and not transmission of the actual pain sensation. Consequently, numerous difficulties have been encountered in attempts to measure the pain experience.

Research has provided a variety of conclusions about the consistency of pain measurements for individuals. Although Hardy et al. (1967) and Schumacher and associates (1940) have found pain threshold to be relatively stable among individuals, other researchers (Beecher, 1957; Clark and Bindra, 1956) have found wide variations among individuals in pain threshold. Pain tolerance among individuals has been found to be less stable than threshold because manipulation of psychological variables appears to have a greater effect on tolerance (Gelfand, 1964; Wolf, 1964). Also, a wide range of tolerance measurements have been reported among individuals and for the same individual under various conditions (Beecher, 1957). Finally, the relationship between pain threshold and tolerance is unclear. While Gelfand and others (1963) and Beecher (1957) found no relationship between threshold and tolerance, others (Clark and Bindra, 1956; Brown et al., 1973; Ryan and Kovacic, 1966) have found a significant correlation.

In summary, Beecher (1957) concluded from a lengthy survey of the literature on pain that 1) pain threshold is not constant from person to person or from time to time in a given individual; 2) many factors produce variations in threshold but no experiment has maintained adequate control over a majority of them; 3) the two components, the original sensation and the pain reaction, have not been satisfactorily separated in experiments; and 4) the reaction component of clinical

pain (fear, anxiety) has not been reproduced in the experimental situation.

As previously noted, Ryan and Kovacic (1966) and Ryan and Foster (1967) established that male athletes have higher pain tolerance than nonathletes. In addition, contact sports athletes had higher pain tolerance than noncontact sports athletes. Muscle ischemia and gross pressure procedures were used to test pain threshold and tolerance. No differences among groups were found with respect to pain threshold. Pain threshold was significantly correlated to pain tolerance.

In a study with female athletes, Walker (1971) found that athletes had a higher pain tolerance than did the nonathletes. Furthermore, the superior athletes were able to withstand more pain than the less skilled athletes. Electrical stimulation was used to produce pain. No differences were reported in pain threshold among groups. Although Walker (1971) proposed that intense concentration might enable one to tolerate pain while performing, attempts to measure this in the laboratory were not successful. Distraction failed to raise the pain tolerance in any of the subjects.

Ellison and Freischlag (1975) found no differences in pain tolerance among intercollegiate sport groups and nonathlete males. Pain was induced from protracted muscular contractions using a weight mechanism on a finger. In addition, no significant differences

were found to exist in pain tolerance when arousal and personality traits were used as the dependent variables. Discriminant analysis revealed that the simultaneous interaction of pain tolerance, arousal, and personality traits prevented the differentiation of the subject groups. Arousal was measured by galvanic skin response while the Bernreuter Personality Inventory was used to measure personality. The researchers concluded that variables other than personality account for sport group differences.

CHAPTER III

DESIGN AND PROCEDURES

The method of this study involved selection of subjects, apparatus and materials used in testing, the experimental design, and the testing procedures.

Subjects

Two groups of subjects participated in this study. The Participant group (N=50) consisted of males who indicated active participation in any one of the following activities: mountain climbing (N=10); ski jumping, racing, or acrobatic skiing (N=12); hang gliding (N=10); skydiving (N=10); and whitewater boating (N=8). The Non-participant group (N=50) consisted of males who indicated in questioning prior to testing that they had never taken part in any of the above activities. The Nonparticipant group was further divided post-experimentally into two subgroups: 1) those with the interest to participate in the risk activities (N=25), and 2) those with no interest to participate in the selected risk activities (N=25).

Males were used in this study because past evidence (Kogan and Wallach, 1964; Roberts, 1975; Atkinson, 1958; Sutton-Smith, Roberts and Kozelka, 1963) demonstrated a difference between males and females in risk taking and game involvement. To avoid confounding by this difference, only males were used as subjects.

Upon signing a volunteer form indicating a willingness to participate and an acknowledgment of the test procedures, each subject was given two pain responsivity tests, Jackson's PRF personality assessment test on four traits, and a recreation participation inventory questionnaire.

Apparatus

So as to measure pain threshold and tolerance, a sphygmomanometer was used with two procedures to deliver controlled pain. The muscle ischemia method, in which a pressure cuff functions as a tourniquet to occlude the blood supply via pressure, was selected as being similar to the pain experienced in muscle fatigue. The gross pressure method was chosen as being representative of bumps and bruises that could be experienced in strenuous physical activity. It was believed that pain induced by these methods most closely stimulated the type of pain associated with physical activity. Reliability of the sphygmomanometer was checked by the University of Montana Health Services and found to be satisfactory.

Muscle Ischemia

The submaximal tourniquet technique used by Harpuder and Stein (1944) was employed to determine pain threshold and tolerance on the arm. The subject sat with the forearm of the dominant arm resting on the desk. The armlet of the sphygmomanometer was wrapped around

the arm above the elbow and inflated to 200 mm Hg. Rhythmic contraction and extension of the fingers at a rate of 42 contractions per minute continued until the subject verbally indicated his pain threshold and tolerance. The rhythmic contractions were done in time to a metronome, and a stopwatch was used to measure threshold (time from beginning of stimulation to first report of pain) and tolerance (from the beginning of stimulation to verbal cue of subject no longer willing to endure the pain) in seconds.

Gross Pressure

In a procedure adapted from Poser (1962), gross pressure tolerance was measured using football cleats and a sphygmomanometer. The cleats were taped to a piece of cardboard which was then placed on the shin of the subject's dominant leg midway between knee and ankle. The armlet of the pressure cuff was wrapped around it. Pressure was gradually increased, at a rate of about 5 mm Hg/second by inflation. Pain threshold and tolerance were measured and recorded in mm Hg.

Materials

Questionnaire booklets were compiled containing questions pertinent to personality (Personality Research Form traits of Aggression, Change, Exhibition, and Harmavoidance), reasons for participation in recreation, perceptions of risk, rating of skill in the selected activities, and frequency of participation in forty activities. The

questionnaire may be found in Appendix II. The entire Jackson Personality Research Form test (Form AA) was not administered because of a time factor so on an a priori assumption four personality dimensions were selected as likely to possess risk or stress taking implications. The scales for each dimension were bipolar so low scores as well as high scores are interpretable in terms of personality characteristics. Maximum score for any particular trait was 20.

Design

A nonorthogonal analysis design (Overall and Spiegel Type II) was used (Overall and Spiegel, 1972). Subjects were assigned to one of two groups (Participant or Nonparticipant). The Nonparticipant subjects were further assigned to one of two subgroups, those with an interest to participate in risk recreation and those with no interest.. All subjects were tested on each of 25 variables. Dependent variables included pain threshold (two measures), pain tolerance (two measures), personality traits (four measures), reasons for participation (nine measures), and perception of risk (five measures). Main effects examined were participation in high risk recreation and interest to participate.

Initially 107 subjects were administered the tests, but seven were discarded because of response discrepancies on pre- and post-experimental questions. A regression model of analysis of variance was used to test differences between groups for Hypotheses I, II,

and III. Pearson product moment correlations were computed to test for significant relationships in Hypotheses IV and V while factor analysis was run to test Hypothesis VI. Due to computer program limitations, three-way ANOVA's could not be run (Hypothesis II) so separate ANOVA's were computed to determine the same end result.

Procedure

Subjects were individually tested in Room 125 of the Human Performance Laboratory. Upon entering the laboratory, the subject was given a consent form which described the experiment briefly. The subject had no prior knowledge that the testing would involve pain. If the subject did not wish to be involved in the study, he did not have to sign the release. It should be noted, however, that no person refused to participate. The pain tests were then administered, and subject was given the following standardized instructions:

Which is your preferred arm, or the arm with which you write? Please rest it on the desk top while I explain the instructions.

I am going to place this pressure cuff on your arm as if I were going to take your blood pressure. I'll then inflate it to a certain level. In time with the metronome I want you to contract and extend your fingers so that every time the metronome clicks, your hand should be closed. In between clicks your fingers should be fully extended.

The rhythmic contractions were demonstrated by the experimenter, and the subject was given time to practice. When the experimenter

was satisfied that the subject had adopted the correct rhythm, the following instructions were given:

You do not need to clench your fist when you close your hand. Just be sure that your hand is completely closed when the metronome clicks and your fingers are fully extended otherwise. If at any time you feel pain, please immediately say "it hurts." Don't stop, though. Continue the rhythmic extension and contraction of your fingers. When the pain becomes so severe that you can no longer tolerate it, say "stop," and the cuff will be quickly removed. Remember, I need two readings: 1) when you first feel pain, and 2) when you find the pain intolerable.

Assurance was then given that there were no lasting harmful effects from the procedures. The cuff was wrapped around the arm, inflated, and measures for ischemic pain threshold and tolerance were recorded.

Following a two-minute rest period, the next pain test was given preceded by these instructions:

This test is a little different but will be measuring the same type of thing. Place your preferred leg on this chair and roll up your pant leg so that your lower leg is exposed. I am going to place these cleats against your shin and wrap the cuff around it. I then am going to gradually inflate the cuff. When you first feel pain, immediately say 'it hurts.' I'll keep pumping it, though, until you find the pain intolerable and say stop. The cuff will then be quickly released. As in the first test I need two readings: 1) when you first feel pain, and 2) when you find the pain intolerable.

Unknown to the subjects, upper limits had been set by the experimenter before testing for both pain tests. The limit for ischemic pain was five minutes, and the limit for gross pressure was 300 mm Hg, the upper limit of the sphygmomanometer gauge.

Following the gross pressure pain test and recording of data in mm Hg, the subject was given the questionnaire booklet containing the activity participation inventory, personality scales, ratings of perceived risk, and ranking of reasons as to why one participates in recreation. Each subject was told to read the directions carefully and to answer the questions as accurately as possible.

Following the experimental testing, each subject was engaged in a brief informal interview in which he was asked what activities he liked the most, what new activities he would like to take up, how he had gotten interested in the activities he now participated in, etc.

Prior to the final determination of the procedures used in this study, a pilot study was conducted Spring Quarter, 1976, so as to practice experimental procedure, to try different sets of instructions, and to determine the procedures to be used in the final study (Appendix III).

CHAPTER IV

RESULTS

One hundred subjects were tested and classified into one of three groups. The mean age of the Participant group was 23.12 years while that for the Nonparticipant group was 22.38 years. The "With Interest" subgroup of Nonparticipants was slightly younger ($\bar{x}=21.68$) than the "No Interest" subgroup of Nonparticipants ($\bar{x}=22.88$). All the subjects were males attending the University of Montana.

In this chapter the statistical analysis of the data is presented. The results of the six hypotheses are as follows:

Tests of Hypothesis I

According to Hypothesis I, active participants of the selected high risk recreation activities will differ from the Nonparticipants by having 1) a higher pain threshold and tolerance; 2) higher scores in Aggression, Change, and Exhibition and lower score in Harm-avoidance as measured by the Personality Research Form; 3) different reasons for participating in recreation; and 4) lower perception of the physical risk involved in the selected outdoor recreation activities

Response to Pain

In an analysis of variance between the Participant and Non-participant groups, differences in ischemic and pressure thresholds and tolerances were tested. Table 1 presents a summary of the tests and reveals that the only significant difference in response to pain between the two groups was in ischemic pain tolerance. The Participant group had a mean ischemic pain tolerance of 177.31 seconds while the Nonparticipant group had a mean tolerance of 144.81 seconds, a difference significant at the .025 level. No differences were found between the two groups in gross pressure threshold or tolerance or for ischemic threshold. Thus, in one measure of response to pain, the participants in risk recreation appeared to be able to withstand more pain than nonparticipants in risk recreation.

Personality

The subjects were tested on each of four personality scales derived from the Personality Research Form (Jackson, 1967). These scales were Aggression, Change, Exhibition, and Harmavoidance. To determine if the Participant group differed significantly from the Nonparticipant group in any of the personality scales, analyses of variance were computed. Table 2 breaks down the personality results between the two groups for each personality scale. The Harmavoidance scale was found to be the only significant trait of

TABLE 1

SUMMARY OF ANOVA BETWEEN PARTICIPANTS IN RISK RECREATION AND NONPARTICIPANTS
WITH PAIN RESPONSE AS THE DEPENDENT VARIABLE

Source of Variation	SS	df	MS	F	Group	Mean	S.D.
Pain Threshold							
Ischemia					Participant	85.95	65.23
Between Treatments	10512.40	1	10512.40	3.11	Nonparticipant	65.43	50.55
Within Treatments	331233.96	98	3379.94				
Pressure					Participant	69.20	52.67
Between Treatments	272.25	1	272.25	.10	Nonparticipant	65.90	50.99
Within Treatments	263302.50	98	2686.76				
Pain Tolerance							
Ischemia					Participant	177.31	72.14
Between Treatments	26403.01	1	26403.01	5.11*	Nonparticipant	144.81	71.66
Within Treatments	506625.21	98	5169.65				
Pressure					Participant	204.80	87.31
Between Treatments	1369.00	1	1369.00	.16	Nonparticipant	197.40	99.61
Within Treatments	860460.00	98	8780.20				

*p<.05

TABLE 2

SUMMARY OF ANOVA BETWEEN PARTICIPANTS IN RISK RECREATION AND NONPARTICIPANTS
WITH PERSONALITY TRAITS AS DEFINED BY PERSONALITY RESEARCH FORM AS DEPENDENT VARIABLES

Source of Variation	SS	df	MS	F	Participants Mean	Participants S.D.	Nonparticipants Mean	Nonparticipants S.D.
Agression								
Between Treatments	3.24	1	3.24	.35	5.1	2.81	5.4	3.28
Within Treatments	914.00	98	9.33					
Change								
Between Treatments	15.60	1	15.60	1.61	12.6	3.43	11.8	2.84
Within Treatments	973.16	98	9.93					
Exhibition								
Between Treatments	18.49	1	18.49	1.15	9.7	3.67	10.5	4.32
Within Treatments	1575.30	98	16.07					
Harmaviodance								
Between Treatments	327.61	1	327.61	27.65*	5.2	3.14	8.9	3.72
Within Treatments	1161.14	98	11.85					

*p<.01

difference. The Participant group scored significantly lower in this trait with a mean score of 5.2 while the Nonparticipant group had a mean score of 8.9. Thus, the participants in risk recreation tended to be characterized by a personality trait indicating an enjoyment of exciting, dangerous, and risky activities. The higher score in Harmavoidance denotes a more cautious, unadventurous person. . .

Since no significant differences were found for the scales of Aggression, Change, and Exhibition, it appears that these traits made approximately equal contributions to the personalities of the subjects in both groups, the participants in risk recreation and the nonparticipants.

Reasons for Participation in Recreation

Nine statements were ranked by each subject to reflect one's motivations for participation in recreation. To determine the overall ranked order of statements, the mean ratings for each statement were placed in order from smallest to largest. To obtain a direct comparison between responses to the statements by the Participant group and the Nonparticipant group, each statement was individually tested by ANOVA. Table 3 reveals that differences significant at the .05 level or less were found for the following statements: Social, Vertigo, Aesthetic, Power, and Ascetic. As can be seen in the table, Participants tended to place greater value in participation in recreation as a source of aesthetics (ranked second)

TABLE 3

SUMMARY OF ANOVA BETWEEN PARTICIPANTS IN
RISK RECREATION AND NONPARTICIPANTS WITH REASONS FOR
PARTICIPATION IN RECREATION AS THE DEPENDENT VARIABLE

Source of Variation	SS	df	MS	F	Ranked Order Part. Nonpart.	
Health and Fitness						
Between treatments	.16	1	.16	.02	4	4
Within treatments	651.40	98	6.65			
Freedom						
Between treatments	14.44	1	14.44	2.58	1	1
Within treatments	548.20	98	5.59			
Skill-testing						
Between treatments	3.61	1	3.61	.70	3	3
Within treatments	504.58	98	5.15			
Social						
Between treatments	56.25	1	56.25	9.18**	7	2
Within treatments	60.07	98	6.13			
Vertigo						
Between treatments	43.56	1	43.56	6.82*	6	9
Within treatments	626.28	98	6.39			
Aesthetic						
Between treatments	59.29	1	59.29	10.78**	2	6
Within treatments	538.90	98	5.50			
Power						
Between treatments	38.44	1	38.44	6.55*	8	7
Within treatments	575.20	98	5.87			
Ascetic						
Between treatments	36.00	1	36.00	5.74*	9	8
Within treatments	614.44	98	6.27			
Accomplishment						
Between treatments	.04	1	.04	.01	5	5
Within treatments	576.32	98	5.88			

*p<.05

**p<.01

than did Nonparticipants (ranked Social second). The Participant group also tended to see the pursuit of vertigo as a greater value of recreation participation than did the Nonparticipant group. The Nonparticipant group, on the other hand, found greater value in recreation as an opportunity to experience competition and hard training (Ascetics) and power.

Perception of Risk

The subjects were asked to rate themselves as either high or low risk takers in general. Analysis of variance was computed to determine if the Participant group rated themselves significantly higher than did the Nonparticipant group. Table 4 shows that there was a broad trend for the Participants to rate themselves as high risk takers in general and for Nonparticipants to rate themselves as low risk takers, $F(1.98)=3.40$, $p \approx .07$.

To analyze this trend in a different manner, a chi square statistic was computed to compare the proportion of subjects from either the Participant or Nonparticipant groups who described themselves as high or low risk takers. A greater frequency of participants in risk recreation described themselves as high risk takers while a greater frequency of nonparticipants in risk recreation described themselves as low risk takers. With one degree of freedom, the chi square value of 4.167 for Table 5 was found to be significant at the .05 level.

TABLE 4

SUMMARY OF ANOVA BETWEEN PARTICIPANTS IN
RISK RECREATION AND NONPARTICIPANTS WITH THE
PERCEPTION OF RISK AS A GENERAL CHARACTERISTIC
AS THE DEPENDENT VARIABLE

Source of Variation	SS	df	MS	F
Risk taking as a general characteristic:				
Between treatments	.81	1	.81	3.40*
Within treatments	23.40	98	.24	

* $p \approx .07$

TABLE 5

FREQUENCIES AND PERCENTAGES OF PARTICIPANTS IN
RISK RECREATION AND NONPARTICIPANTS AND THEIR
RATINGS OF THEMSELVES AS HIGH OR LOW RISK TAKERS

Self-rating of risk taking as a general characteristic	Participants		Nonparticipants		Total
	Number	Percent	Number	Percent	
Self-rated high risk taker	35	70.0	25	50.0	60
Self-rated low risk taker	15	30.0	25	50.0	40
Total	50	100.0	50	100.0	100

In the questionnaire the subjects were asked to rate the amount of physical risk they perceived to be involved in each of the five selected outdoor recreation activities. The choices to consider were low (1), medium (2), and high (3) risk. Analysis of variance was used to study the differences between the Participant and Non-participant groups with respect to the amount of risk perceived in the selected activities. Table 6 shows that significant differences were found for the ratings of risk in ski jumping (acrobatic, and racing), hang gliding, and skydiving. Participants tended to view ski jumping, hang gliding, and skydiving as lower in risk than did Nonparticipants. All subjects, regardless of group classification, tended to rate mountain climbing as medium to high in risk and whitewater boating as medium to low in risk.

To more thoroughly depict how the subjects rated the risk in the five selected activities, frequencies of risk ratings were reported for the two groups. These frequencies are displayed in Table 7. From Table 7 it can be seen that most subjects tended to rate the physical risk in the activities as medium. However, the Nonparticipants were more likely to give a high risk rating to the activities while the Participants were more likely to give a low risk rating. The outdoor recreation activities receiving the greatest number of high risk ratings were mountain climbing and hang gliding.

TABLE 6

SUMMARY TABLE OF ANOVA BETWEEN PARTICIPANTS IN
RISK RECREATION AND NONPARTICIPANTS WITH
PERCEPTION OF PHYSICAL RISK IN THE SELECTED
ACTIVITIES AS THE DEPENDENT VARIABLE

Source of Variation	SS	df	MS	F
Perceived physical risk in:				
Mountain climbing				
Between treatments	.36	1	.36	.72
Within treatments	48.88	98	.50	
Ski jumping, racing, acrobatic				
Between treatments	.98	1	.98	5.78*
Within treatments	42.42	98	.44	
Hang gliding				
Between treatments	4.00	1	4.00	7.46*
Within treatments	52.56	98	.54	
Skydiving				
Between treatments	9.00	1	9.00	17.64**
Within treatments	49.50	98	.51	
Whitewater boating				
Between treatments	.64	1	.64	1.54
Within treatments	40.80	98	.42	

*p<.05

**p<.01

TABLE 7

FREQUENCIES AND PERCENTAGES OF PARTICIPANTS IN RISK ACTIVITIES AND NONPARTICIPANTS AND THEIR
RATINGS OF PHYSICAL RISK IN THE FIVE SELECTED ACTIVITIES

Recreation Activity	Amount of Perceived Physical Risk	Participant Group		Nonparticipant Group		Total
		Number	Percent	Number	Percent	
Mountain Climbing	Low	9	18.0	6	12.0	15
	Medium	22	44.0	22	44.0	44
	High	19	38.0	22	44.0	41
	Total	50	100.0	50	100.0	100
Ski Jumping Acrobatic Racing	Low	16	32.0	8	16.0	24
	Medium	27	54.0	27	54.0	54
	High	7	14.0	15	30.0	22
	Total	50	100.0	50	100.0	100
Hang Gliding	Low	10	20.0	7	14.0	17
	Medium	22	44.0	20	40.0	42
	High	18	36.0	23	46.0	41
	Total	50	100.0	50	100.0	100
Skydiving	Low	17	34.0	7	14.0	24
	Medium	28	56.0	26	52.0	54
	High	5	10.0	17	34.0	22
	Total	50	100.0	50	100.0	100
Whitewater Boating	Low	17	34.0	13	26.0	30
	Medium	28	56.0	28	56.0	56
	High	5	10.0	9	18.0	14
	Total	50	100.0	50	100.0	100

Support for Hypothesis I

When the appropriate null hypotheses were statistically tested with ANOVA, significant differences at the .05 level or less were found in eleven of twenty-three comparisons. Thus, although the null hypotheses could not be rejected in all cases, enough evidence was presented to show that Participants in risk recreation did differ from Nonparticipants in response to pain, personality, reasons for participation in recreation, and perception of risk.

Tests of Hypothesis II

Hypothesis II sought to determine if differences existed between the Participant group and two subgroups of Nonparticipants, i.e. those who had an interest to participate in the risk activities and those who had no interest. These two subdivisions of Nonparticipants were labeled the "With Interest" subgroup and the "No Interest" subgroup. It was predicted that the Participant group would differ more from the Nonparticipant "No Interest" subgroup than from the Nonparticipant "With Interest" subgroup. Thus, two main effects were under consideration in analysis of this hypothesis: 1) participation in risk recreation, and 2) interest to participate in risk recreation.

Response to Pain

Analysis of variance was computed to test for differences in

pain threshold and tolerance among the Participant group, the "With Interest" subgroup of Nonparticipants, and the "No Interest" subgroup of Nonparticipants.

Pain threshold. Results of the ANOVA for ischemic and pressure threshold reveal that no significant differences (at the .05 level) in pain threshold were found among the three groups. For results of the ANOVA see Table 33, Supplementary Tables, Appendix IV.

Pain tolerance. Table 8 displays the results of ANOVA among the three experimental groups with pain tolerance as the dependent variable. Although the groups did not differ in pain tolerance as measured by gross pressure, significant differences did occur in pain tolerance measured by ischemia. The Participant group had the highest ischemic pain tolerance with a mean of 177.31 seconds. The pain tolerance of the "No Interest" subgroup of Nonparticipants was significantly lower with a mean of 137.25 seconds. The "With Interest" subgroup of Nonparticipants fell in between the two above groups with a mean score of 152.38 seconds. Thus, although interest to participate made some contribution to the variance in the pain tolerance data, a greater amount of the variance could be explained by the participation variable.

Personality

Subjects were tested on four scales from the Personality Research Form: Aggression, Change, Exhibition, and Harmavoidance. There

TABLE 8

SUMMARY OF ANOVA AMONG PARTICIPANTS IN RISK RECREATION, NONPARTICIPANTS "WITH INTEREST",
AND NONPARTICIPANTS "NO INTEREST" WITH PAIN TOLERANCE AS THE DEPENDENT VARIABLE

Source of Variation	SS	df	MS	F	Group	Mean	S.D.
Ischemic Tolerance							
Participants vs. Nonparticipants "With Interest"					Participants	117.31	72.14
Between treatments	10358.40	1	10358.40	2.03			
Within treatments	372981.41	73	5109.33				
Participants vs. Nonparticipants "No Interest"					Nonparticipants	152.38	70.11
Between treatments	26754.73	1	26754.73	5.06*	"With Interest"		
Within treatments	385792.19	73	5284.82				
Nonparticipants "With Interest" vs. "No Interest"					Nonparticipants	137.25	73.82
Between treatments	2863.73	1	2863.73	.55	"No Interest"		
Within treatments	248749.49	48	5182.28				
Pressure Tolerance							
Participants vs. Nonparticipants "With Interest"					Participants	204.80	87.31
Between treatments	1014.00	1	1014.00	.13			
Within treatments	590053.84	73	8082.93				
Participants vs. Nonparticipants "No Interest"					Nonparticipants	212.60	94.99
Between treatments	8512.66	1	8512.66	.98	"With Interest"		
Within treatments	632351.87	73	8662.35				
Nonparticipants "With Interest" vs. "No Interest"					Nonparticipants	182.20	103.85
Between treatments	11552.00	1	11552.00	1.17	"No Interest"		
Within treatments	475409.97	48	9904.37				

*p<.05

were no significant differences in personality traits Aggression and Exhibition among the three groups (Participants, Nonparticipants "With Interest", and Nonparticipants "No Interest"). These results are displayed in Tables 34, 35, Supplemental Tables, Appendix IV. Apparently then, these two traits made approximately equal contributions to the personalities of subjects in all three groups.

Harmavoidance. Table 9 lists the summary of ANOVA for Harmavoidance among the three groups: Participants in risk recreation, Nonparticipants with an interest to participate, and Nonparticipants with no interest to participate. The Harmavoidance scale revealed a significant difference among the personalities of the subjects of the three groups as a measure of enjoyment of exciting activities. The mean score of 5.24 indicated that the Participants could be described as adventurous and liking exciting activities particularly if risk were involved. Since the Nonparticipants "With Interest" with a mean score of 6.44 did not differ significantly from the Participants, they also can be described in the same manner. However, both of these groups differed markedly from the third group, the "No Interest" subgroup of Nonparticipants. This latter group had a mean score of 11.28 on the Harmavoidance scale. Therefore, those Nonparticipants with no interest to participate in risk recreation might be described as avoidant of risk or bodily harm and not enjoying activities with an element of danger. Since interest to participate

TABLE 9

SUMMARY OF ANOVA AMONG PARTICIPANTS IN RISK RECREATION,
NONPARTICIPANTS "WITH INTEREST", AND NONPARTICIPANTS
"NO INTEREST" WITH THE PERSONALITY RESEARCH FORM
SCALE OF HARMAVOIDANCE AS THE DEPENDENT VARIABLE

Source of Variation	SS	df	MS	F	Group	Mean	S.D.
Participants vs. Nonparticipants "With Interest"							
Between treatments	24.00	1	24.00	2.78	Participants	5.24	3.14
Within treatments	629.28	73	8.62				
Participants vs. Nonparticipants "No Interest"							
Between treatments	608.03	1	608.03	61.46*	Nonparticipants "With Interest"	6.44	2.47
Within treatments	722.16	73	9.89				
Nonparticipants "With Interest" vs. "No Interest"							
Between treatments	292.82	1	292.82	36.49*	Nonparticipants "No Interest"	11.28	3.15
Within treatments	385.20	48	8.02				

*p<.01

in risk recreation is descriptive of both the Participant group and those Nonparticipants who indicated they would like to engage in such activities, a large portion of the variance in Harmavoidance among the three groups could be explained by the interest variable. A smaller, though not significant, amount of the variance might be explained by the participation variable.

Change. Table 10 shows the summary of ANOVA for the personality trait Change among the three groups: the Participants, the Nonparticipants "With Interest", and the Nonparticipants "No Interest." Change was found to be a significant trait of difference in the three-way comparison of groups. The Participant group and "With Interest" subgroup of Nonparticipants had very similar scores with mean values of 12.62 and 12.84, respectively. These two groups scored significantly higher than the "No Interest" subgroup of Nonparticipants ($\bar{x}=10.80$). Thus, the interest variable accounted for the greatest portion of the variance. Those with an interest to participate in risk recreation (those who already did and those who would like to) might be characterized by a greater enjoyment of new and different activities and avoidance of routine.

Reasons for Participation in Recreation

A comparison of the ranked order of statements reflecting reasons for participation in recreation was made among the Participant group, "With Interest" subgroup of Nonparticipants, and "No Interest" subgroup

TABLE 10

SUMMARY OF ANOVA AMONG PARTICIPANTS IN RISK RECREATION,
NONPARTICIPANTS "WITH INTEREST", AND NONPARTICIPANTS
"NO INTEREST" WITH THE PERSONALITY RESEARCH FORM
SCALE OF CHANGE AS THE DEPENDENT VARIABLE

Source of Variation	SS	df	MS	F	Group	Mean	S.D.
Participants vs. Nonparticipants "With Interest"							
Between treatments	.81	1	.81	.09	Participants	12.62	3.43
Within treatments	677.14	73	9.28				
Participants vs. Nonparticipants "No Interest"							
Between treatments	55.21	1	55.21	4.90*	Nonparticipants	12.84	2.03
Within treatments	821.78	73	11.26		"With Interest"		
Nonparticipants "With Interest" vs. "No Interest"							
Between treatments	52.02	1	52.02	7.27**	Nonparticipants	10.80	3.36
Within treatments	343.36	48	7.15		"No Interest"		

*p<.05

**p<.01

of Nonparticipants. To obtain a direct comparison between responses to the statements by each of the three groups, each statement was individually tested by ANOVA. Table 11 lists the overall rankings for the nine statements by each of the three groups. Significant differences in ranking were found for the following statements: Social, Vertigo, Aesthetic, Power, and Ascetic.

Participants in risk recreation tended to view recreation primarily as a source of freedom, aesthetics, and situations to test skills. Nonparticipants who indicated an interest in engaging in risk recreation tended to value the freedom, health and fitness, and skill-testing aspects of recreation. Thos Nonparticipants who had no desire to become involved in risk recreation tended to view recreation primarily as an opportunity to experience social interaction, freedom, and testing of skills.

Recreation as a social experience. Table 12 shows the analysis of variance among the three groups with respect to the ranking of social interaction as a value of recreation. The "No Interest" subgroup of Nonparticipants ranked the Social statement first, the "With Interest" subgroup of Nonparticipants ranked it fifth, and the Participant group ranked it seventh, a significant difference only between the Nonparticipant "No Interest" subgroup and the Participant group.

TABLE 11

RANKED ORDER OF REASONS FOR PARTICIPATION
IN RECREATION BY PARTICIPANTS, NONPARTICIPANTS
"WITH INTEREST", AND NONPARTICIPANTS "NO INTEREST"

Statement	Partici- pants	Nonparticipants "With Interest"	Nonparticipants "No Interest"
Health and Fitness	4	2.5	5
Freedom	1	1	2
Skill-testing	3	2.5	3
Social*	7	5	1
Vertigo*	6	9	9
Aesthetic*	2	7	6
Power*	8	6	7
Ascetic*	9	8	8
Accomplishment	5	4	4

*Significant differences in ranking, $p < .05$

TABLE 12

SUMMARY OF ANOVA AMONG PARTICIPANTS IN RISK RECREATION, NONPARTICIPANTS "WITH INTEREST," AND NONPARTICIPANTS "NO INTEREST" WITH RESPECT TO THE RANK OF SOCIAL INTERACTION AS A REASON FOR PARTICIPATION IN RECREATION

Source of Variation	SS	df	MS	F	Group	Ranked Order
Participants vs. Nonparticipants "With Interest"						
Between treatments	15.36	1	15.36	2.55	Participants	7
Within treatments	439.12	73	6.02			
Participants vs. Nonparticipants "No Interest"						
Between treatments	69.36	1	69.36	12.47*	Nonparticipants "With Interest"	5
Within treatments	406.16	73	5.56			
Nonparticipants "With Interest" vs. "No Interest"						
Between treatments	.15	1	.15	2.14	Nonparticipants "No Interest"	1
Within treatments	327.04	48	6.81			

*p<.01

Recreation as a vertigo experience. Table 13 reveals the analysis of variance among the three groups with respect to the ranking of Vertigo as a reason for participation in recreation. The Participant group ranked the Vertigo statement significantly higher than did either of the two subgroups of Nonparticipants. Thus, the participants in risk recreation indicated greater enjoyment of a strong element of daring in recreation.

Recreation as an aesthetic experience. Table 14 displays the analysis of variance among the three experimental groups with respect to the ranking of aesthetics as a value of recreation. The Participant group ranked the Aesthetic statement significantly higher than did either of the two subgroups of Nonparticipants. Thus, the participants in risk recreation tended to view the beauty of scenery or movement as a greater value of recreation.

Recreation as a power experience. Table 15 shows the analysis of variance among the three groups with respect to the ranking of power as a value of recreation. The statement was not ranked highly by any of the three groups, but the "With Interest" subgroup of Nonparticipants did rank it higher ($p < .05$) than did the Participant group. This denoted that in comparison to participants in risk recreation those nonparticipants who indicated an interest to engage in such activities viewed recreation as a greater opportunity to experience a feeling of forcefulness and power.

TABLE 13

SUMMARY OF ANOVA AMONG PARTICIPANTS IN RISK RECREATION, NONPARTICIPANTS "WITH INTEREST," AND NONPARTICIPANTS "NO INTEREST" WITH RESPECT TO THE RANK OF VERTIGO AS A REASON FOR PARTICIPATION IN RECREATION

Source of Variation	SS	df	MS	F	Group	Ranked Order
Participants vs. Nonparticipants "With Interest"						
Between treatments	41.61	1	41.61	6.71*	Participants	6
Within treatments	452.74	73	6.20			
Participants vs. Nonparticipants "No Interest"						
Between treatments	46.56	1	46.56	6.69*	Nonparticipants	9
Within treatments	507.94	73	6.96		"With Interest"	
Nonparticipants "With Interest" vs. "No Interest"						
Between treatments	3.28	1	3.28	.57	Nonparticipants	9
Within treatments	285.12	48	5.94		"No Interest"	

*p<.05

TABLE 14

SUMMARY OF ANOVA AMONG PARTICIPANTS IN RISK RECREATION, NONPARTICIPANTS "WITH INTEREST," AND NONPARTICIPANTS "NO INTEREST" WITH RESPECT TO THE RANK OF AESTHETICS AS A REASON FOR PARTICIPATION IN RECREATION

Source of Variation	SS	df	MS	F	Group	Ranked Order
Nonparticipants vs. Nonparticipants "With Interest"						
Between treatments	51.63	1	51.63	9.11**	Participants	2
Within treatments	413.52	73	5.66			
Participants vs. Nonparticipants "No Interest"						
Between treatments	29.04	1	29.04	5.54*	Nonparticipants	7
Within treatments	382.48	73	5.24		"With Interest"	
Nonparticipants "With Interest" vs. "No Interest"						
Between treatments	2.42	1	2.42	.42	Nonparticipants	6
Within treatments	276.96	48	5.77		"No Interest"	

*p<.05

**p<.01

TABLE 15

SUMMARY OF ANOVA AMONG PARTICIPANTS IN RISK RECREATION, NONPARTICIPANTS "WITH INTEREST," AND NONPARTICIPANTS "NO INTEREST" WITH RESPECT TO THE RANK OF POWER AS A REASON FOR PARTICIPATION IN RECREATION

Source of Variation	SS	df	MS	F	Group	Ranked Order
Participants vs. Nonparticipants "With Interest"						
Between treatments	29.04	1	29.04	4.99*	Participants	8
Within treatments	424.64	73	5.82			
Participants vs. Nonparticipants "No Interest"						
Between treatments	22.43	1	23.43	3.75	Nonparticipants "With Interest"	6
Within treatments	437.12	73	5.99			
Nonparticipants "With Interest" vs. "No Interest"						
Between treatments	.32	1	.32	.05	Nonparticipants "No Interest"	7
Within treatments	288.00	48	6.00			

*p<.05

Recreation as an ascetic experience. Table 16 displays the analysis of variance among the three groups with respect to the ranking of ascetics as a value of recreation. The statement was not ranked highly by any of the three groups, but the "With Interest" subgroup of Nonparticipants did rank it significantly higher than did the Participant group. This implied that in comparison to participants in risk recreation, those nonparticipants with a desire to become involved in such activities viewed recreation as having greater ascetic value.

Perception of Risk

Subjects were asked to indicate whether they felt they were, in general, high or low risk takers. Analysis of variance was computed to determine if the three groups (Participants, Nonparticipants "With Interest," and Nonparticipant "No Interest") rated themselves significantly different. Table 17 shows the summary of this analysis. Both the Participant group and the "With Interest" subgroup of Nonparticipants tended to describe themselves as high risk takers while the "No Interest" subgroup of Nonparticipants tended to describe themselves as low risk takers. Thus, those who were interested in participating in risk recreation, whether or not they already did so, were inclined to characterize themselves as high risk takers in general.

TABLE 16

SUMMARY OF ANOVA AMONG PARTICIPANTS IN RISK RECREATION, NONPARTICIPANTS "WITH INTEREST", AND NONPARTICIPANTS "NO INTEREST" WITH RESPECT TO THE RANK OF ASCETICS AS A REASON FOR PARTICIPATION IN RECREATION

Source of Variation	SS	df	MS	F	Group	Ranked Order
Participants vs. Nonparticipants "With Interest"						
Between treatments	37.50	1	37.50	6.47*	Participants	9
Within treatments	422.98	73	5.79			
Participants vs. Nonparticipants "No Interest"						
Between treatments	13.50	1	13.50	2.12	Nonparticipants	8
Within treatments	465.78	73	6.38		"With Interest"	
Nonparticipants "With Interest" vs. "No Interest"						
Between treatments	4.50	1	4.50	.65	Nonparticipants	8
Within treatments	331.11	48	6.90		"No Interest"	

* $p < .05$

TABLE 17

SUMMARY OF ANOVA AMONG PARTICIPANTS IN RISK RECREATION,
NONPARTICIPANTS "WITH INTEREST", AND NONPARTICIPANTS
"NO INTEREST" WITH PERCEPTION OF RISK AS A GENERAL
CHARACTERISTIC AS THE DEPENDENT VARIABLE

Source of Variation	SS	df	MS	F
Participants vs. Nonparticipants "With Interest"				
Between treatments	.24	1	.24	1.18
Within treatments	14.88	73	.20	
Participants vs. Nonparticipants "No Interest"				
Between treatments	3.84	1	3.84	18.84*
Within treatments	14.88	73	.20	
Nonparticipants "With Interest" vs. "No Interest"				
Between treatments	4.50	1	4.50	27.00*
Within treatments	8.00	48	.17	

* $p < .01$

The subjects were asked to rate what they believed to be the amount of physical risk (low, medium, high) in five outdoor recreation activities. Analysis of variance was computed to determine differences with respect to the amount of perceived risk in the selected activities among the three groups. Tables 18, 19, 20, 21, and 22 show that significant differences were found in the ratings of physical risk in skiing, hang gliding, skydiving, and whitewater boating but not in mountain climbing.

Perceived risk in ski jumping, racing, acrobatic. Table 18 shows the analysis of variance among the three groups with respect to the perception of physical risk in certain styles of skiing. Participants in risk recreation rated the skiing styles significantly different than the "No Interest" subgroup of Nonparticipants. By referring to Table 22, which presents the frequencies of risk ratings for each activity, it can be seen that the Participants in risk recreation tended to rate the physical risk in skiing as medium to low while the "No Interest" subgroup of Nonparticipants tended to rate it as medium to high.

Perceived risk in hang gliding. Table 19 shows the analysis of variance among the three groups with respect to the perception of physical risk in hang gliding. The Participant group rated hang gliding significantly different in risk than did the "No Interest" subgroup of Nonparticipants. By referring to Table 22, it can be seen

TABLE 18

SUMMARY OF ANOVA AMONG PARTICIPANTS IN RISK RECREATION,
 NONPARTICIPANTS "WITH INTEREST", AND NONPARTICIPANTS
 "NO INTEREST" WITH PERCEPTION OF PHYSICAL RISK IN
 SKI JUMPING, RACING, OR ACROBATIC SKIING AS THE DEPENDENT VARIABLE

Source of Variation	SS	df	MS	F
Participants vs. Nonparticipants "With Interest"				
Between treatments	.54	1	.54	1.26
Within treatments	31.38	73	.43	
Participants vs. Nonparticipants "No Interest"				
Between treatments	3.53	1	3.53	7.94*
Within treatments	32.42	73	.44	
Nonparticipants "With Interest" vs. "No Interest"				
Between treatments	.98	1	.98	2.24
Within treatments	21.04	48	.44	

*p<.01

TABLE 19

SUMMARY OF ANOVA AMONG PARTICIPANTS IN RISK RECREATION,
NONPARTICIPANTS "WITH INTEREST", AND NONPARTICIPANTS
"NO INTEREST" WITH PERCEPTION OF PHYSICAL RISK IN
HANG GLIDING AS THE DEPENDENT VARIABLE

Source of Variation	SS	df	MS	F
Participants vs. Nonparticipants "With Interest"				
Between treatments	.96	1	.96	1.80
Within treatments	39.04	73	.53	
Participants vs. Nonparticipants "No Interest"				
Between treatments	5.23	1	5.23	9.56*
Within treatments	39.92	73	.55	
Nonparticipants "With Interest" vs. Nonparticipants "No Interest"				
Between treatments	1.28	1	1.28	2.60
Within treatments	23.60	48	.49	

*p<.01

TABLE 20

SUMMARY OF ANOVA AMONG PARTICIPANTS IN RISK RECREATION,
NONPARTICIPANTS "WITH INTEREST", AND NONPARTICIPANTS
"NO INTEREST" WITH PERCEPTION OF PHYSICAL RISK IN
SKYDIVING AS THE DEPENDENT VARIABLE

Source of Variation	SS	df	MS	F
Participants vs. Nonparticipants "With Interest"				
Between treatments	2.16	1	2.16	4.27*
Within treatments	36.96	73	.51	
Participants vs. Nonparticipants "No Interest"				
Between treatments	11.76	1	11.76	22.50**
Within treatments	38.16	73	.52	
Nonparticipants "With Interest" vs. "No Interest"				
Between treatments	2.88	1	2.88	7.23*
Within treatments	19.12	48	.40	

*p<.05

**p<.01

TABLE 21

SUMMARY OF ANOVA AMONG PARTICIPANTS IN RISK RECREATION,
NONPARTICIPANTS "WITH INTEREST", AND NONPARTICIPANTS
"NO INTEREST" WITH PERCEPTION OF PHYSICAL RISK
IN WHITEWATER BOATING AS THE DEPENDENT VARIABLE

Source of Variation	SS	df	MS	F
Participants vs. Nonparticipants "With Interest"				
Between treatments	.03	1	.03	.06
Within treatments	30.16	73	.41	
Participants vs. Nonparticipants "No Interest"				
Between treatments	2.16	1	2.16	5.68*
Within treatments	27.76	73	.38	
Nonparticipants "With Interest" vs. "No Interest"				
Between treatments	2.00	1	2.00	4.88*
Within treatments	19.68	48	.41	

*p<.05

that the Participants in risk recreation tended to rate the physical risk in hang gliding as medium while the "No Interest" subgroup of Nonparticipants tended to rate it as high.

Perceived risk in skydiving. Table 20 presents the analysis of variance among the three groups with respect to the perception of physical risk in skydiving. The three experimental groups rated skydiving significantly different in risk from one another. From Table 22 it can be seen that the Participant group tended to give a medium or low rating of the physical risk in skydiving, the "With Interest" subgroup of Nonparticipants tended to give a medium rating of risk, and the "No Interest" subgroup tended to give a high rating of risk.

Perceived risk in whitewater boating. Table 21 shows the analysis of variance among the three experimental groups with respect to the perception of physical risk in whitewater boating. Although no difference in ratings occurred between the Participant group and the "With Interest" subgroup of Nonparticipants, the Participants differed significantly from the "No Interest" subgroup of Nonparticipants, and the "No Interest" subgroup differed significantly from the "With Interest" subgroup in risk ratings. The pattern of responses can be determined by referring to Table 22. Both the Participant group and the "With Interest" subgroup of Nonparticipants tended to give medium and low ratings of physical risk to whitewater

TABLE 22

FREQUENCIES AND PERCENTAGES OF PARTICIPANTS IN RISK RECREATION, NONPARTICIPANTS "WITH INTEREST", AND NONPARTICIPANTS "NO INTEREST" AND THEIR RATINGS OF PHYSICAL RISK IN THE FIVE SELECTED RECREATION ACTIVITIES

Recreation Activity	Amount of Perceived Physical Risk	Participants		Nonparticipants "With Interest"		Nonparticipants "No Interest"		Total
		No.	Percent	No.	Percent	No.	Percent	
Mountain Climbing	Low	9	18.0	3	12.0	3	12.0	15
	Medium	22	44.0	11	44.0	11	44.0	44
	High	19	38.0	11	44.0	11	44.0	41
	Total	50	100.0	25	100.0	25	100.0	100
Ski jumping Racing Acrobatic	Low	16	32.0	5	20.0	3	12.0	24
	Medium	27	54.0	15	60.0	12	48.0	54
	High	7	14.0	5	20.0	10	40.0	22
	Total	50	100.0	25	100.0	25	100.0	100
Hang Gliding	Low	10	20.0	4	16.0	3	12.0	17
	Medium	22	44.0	12	48.0	8	32.0	42
	High	18	36.0	9	36.0	14	56.0	41
	Total	50	100.0	25	100.0	25	100.0	100
Skydiving	Low	17	34.0	5	20.0	2	8.0	24
	Medium	28	56.0	16	64.0	10	40.0	54
	High	5	10.0	4	16.0	13	52.0	22
	Total	50	100.0	25	100.0	25	100.0	100
Whitewater Boating	Low	17	34.0	10	40.0	3	12.0	20
	Medium	28	56.0	12	48.0	16	64.0	56
	High	5	10.0	3	12.0	6	24.0	14
	Total	50	100.0	25	100.0	25	100.0	100

boating while the "No Interest" subgroup tended to give medium and high ratings. Thus, those who had an interest to participate in risk recreation, whether or not they already participated, tended to perceive the physical risk in whitewater boating as lower.

Support for Hypothesis II

When the appropriate null hypotheses were statistically tested with analysis of variance, significant differences at the .05 level or less were found in the examination of 23 dependent variables. In the comparison between the Participant group and the "With Interest" subgroup of Nonparticipants, five significant differences were found. In the comparison between the Participant group and the "No Interest" subgroup of Nonparticipants, thirteen significant differences were established. In the comparison between the two subgroups of Nonparticipants, five significant differences were found. Thus, although the Participants in risk recreation differed from the Nonparticipants (evidence from Hypothesis I), most of the differences were between the Participants and those Nonparticipants who lacked the interest to engage in the risk activities. This indicated a greater effect of the interest variable as opposed to the participation variable in accounting for differences among the three groups.

Tests of Hypothesis III

Hypothesis III sought to determine if differences existed among the participants in the five selected outdoor recreation activities. It was predicted that differences in response to pain, personality, reasons for participation in recreation, and perception of risk might occur among mountain climbers (N=10), ski jumpers, racers, acrobatic skiers (N=12), hang glider pilots (N=10), skydivers (N=10), and whitewater boaters (N=8).

Response to Pain

A five-way analysis of variance was computed to test for differences in pain tolerance among the participants in the five selected outdoor recreation activities. Results of the ANOVA (See Table 36 Supplementary Tables, Appendix IV) showed that no significant differences were found among any of the five outdoor recreation activity subgroups in either ischemic or gross pressure pain tolerance.

Personality

To determine if the enthusiasts of the five selected risk recreation activities differed from one another in personality traits, analysis of variance was computed. Table 23 shows that only one F-ratio was significant, that of Harmavoidance. Thus, the traits of Aggression, Change, and Exhibition made approximately equal contributions to the personalities of mountain climbers, skiers,

TABLE 23

MEANS, STANDARD DEVIATIONS, F-RATIOS, AND T-TESTS OF THE PARTICIPANTS
IN THE FIVE SELECTED RECREATION ACTIVITIES WITH PERSONALITY
TRAITS AS DEFINED BY THE PERSONALITY RESEARCH FORM AS THE DEPENDENT VARIABLE

Personality Scale	<u>Mountain Climbers</u>		<u>Ski Jumpers Racers, etc.</u>		<u>Hang Glider Pilots</u>		<u>Skydivers</u>		<u>Whitewater Boaters</u>		F
	M	S.D.	M	S.D.	M	S.D.	M	S.D.	M	S.D.	
Aggression	5.7	3.06	5.4	2.68	5.2	1.32	4.5	2.59	5.0	4.53	.24
Change	12.5	3.50	11.6	3.75	13.3	3.50	12.8	4.13	13.3	1.98	.10
Exhibition	11.1	4.04	10.2	3.24	8.7	3.37	10.3	2.11	7.6	5.15	1.34
Harmavoidance	4.5	3.57	4.2	1.59	5.9	3.63	5.4	3.17	6.8	3.58	14.85**

T-TEST DATA OF HARMAVOIDANCE

Activity	Number of Subjects	Mean	S.D.	df	t-Value
Whitewater Boating	8	6.8	3.58	18	2.22*
Ski Jumping, Racing, Acrobatic	12	4.2	1.59		

*p<.05

**p<.01

hang glider pilots, skydivers, and whitewater boaters. However, the trait of Harmavoidance was not represented equally in the personalities of participants in these recreation activities.

A t-test was used to determine which mean scores in Harmavoidance among the five subgroups were different. As can be seen in Table 23, only the difference in the Harmavoidance scale scores between whitewater boaters and skiers was significant at the .05 level. Since the mean score of the participants in the skiing category ($\bar{x}=4.2$) was significantly lower than the mean score of the whitewater boaters ($\bar{x}=6.8$), the skiers might better be described as being adventurous and enjoying risky activities.

Reasons for Participation in Recreation

Analysis of variance was computed to determine if there were differences in reasons for participation in recreation among the enthusiasts of the five selected activities. The ranked order of reasons by the participants in the five activities are displayed in Table 24 (see Table 37, Supplementary Tables, Appendix IV for a summary of the F-ratios). Table 24 reveals that there were no significant differences among the groups in the ranking of reasons except for the statement regarding the enjoyment of a thrilling sense of danger; i.e., Vertigo. When a series of t-tests were run to determine how the values placed on Vertigo by the five activity subgroups differed, two significant results were found. As seen

TABLE 24

RANKED ORDER OF REASONS FOR PARTICIPATION IN RECREATION
BY PARTICIPANTS IN THE FIVE SELECTED RECREATION ACTIVITIES

Statement	Mountain Climbers	Ski Jumpers Racers, etc.	Hang Glider Pilots	Skydivers	Whitewater Boaters
Health and Fitness	6	5	5	6	2.5
Freedom	3	2	1	1	1
Skill-testing	2	1	3	3	5
Social	7	8	8	4	6
Vertigo*	5	4	6	7	8.5
Aesthetic	1	3	2	2	4
Power	8	7	7	9	8.5
Ascetic	9	9	9	8	77
Accomplishment	4	6	4	5	2.5

T-TEST DATA OF VERTIGO

Activity	Number of Subjects	Mean	S.D.	df	T-Value
Whitewater Boaters	8	7.25	1.79		
Mountain Climbers	10	4.30	2.83	16	2.12*
Ski Jumpers, et al.	12	4.50	2.58	18	2.62*

*p<.05

TABLE 25

SUMMARY OF ANOVA AND T-TESTS AMONG PARTICIPANTS
IN THE FIVE SELECTED RECREATION ACTIVITIES
WITH PERCEPTION OF RISK AS THE DEPENDENT VARIABLE

Source of Variation	SS	df	MS	F
Mountain Climbing				
Among treatments	3.93	4	.98	2.00
Within treatments	22.07	45	.49	
Ski Jumping, Racing, Acrobatic				
Among treatments	1.18	4	.30	.67
Within treatments	20.20	45	.45	
Hang Gliding				
Among treatments	6.01	4	1.50	3.13*
Within treatments	21.67	45	.48	
Skydiving				
Among treatments	3.43	4	.86	1.56
Within treatments	24.57	45	.55	
Whitewater Boating				
Among treatments	1.75	4	.44	1.12
Within treatments	17.37	45	.39	

T-TEST DATA OF HANG GLIDING

Activity	Number of Subjects	Mean	S. D.	df	T- Value
Hang Glider Pilots	10	1.4	.52		
Mountain Climbers	10	2.3	.68	18	3.33**
Whitewater Boaters	8	2.4	.74	16	3.37**

*p<.05

**p<.01

in Table 24, mountain climbers and skiers tended to rank Vertigo as a greater value of recreation participation than did whitewater boaters.

Perception of Risk

Analysis of variance was used to study the difference among the five risk recreation subgroups with respect to the perception of risk. There was no significant difference in the self-report of risk taking as a general characteristic (See Table 38, Supplementary Tables, Appendix IV). All the subjects, regardless of which activity they were participants, tended to rate themselves as high risk takers.

Table 25 presents the analysis of variance among the five recreation subgroups with respect to the perception of physical risk. Only the perceived physical risk in the activity of hang gliding achieved significance at the .05 level. Hang glider pilots tended to view hang gliding as lower in risk than did mountain climbers and whitewater boaters.

To depict more clearly how the physical risk involved in the five selected activities was rated, frequencies of risk ratings by the participants in each of the five activities were reported. Table 26 displays the results. It might be expected that participants in a certain activity might tend to perceive low physical risk in that activity. As can be seen in the table, this occurred with respect to hang glider pilots and hang gliding, skydivers and skydiving,

TABLE 26

FREQUENCIES AND PERCENTAGES OF PHYSICAL RISK RATINGS
IN THE FIVE SELECTED OUTDOOR RECREATION ACTIVITIES
BY THE PARTICIPANTS IN EACH OF THOSE ACTIVITIES

Recreation Activity	Amount of Perceived Physical Risk	Mountain Climbers		Ski Jumpers, Racers, Acrobatic		Hang Glider Pilots		Skydivers		Whitewater Boaters		Total
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	
Mountain Climbing	Low	1	10.0	1	8.3	1	10.0	3	30.0	3	37.5	9
	Medium	3	30.0	6	50.0	4	40.0	6	60.0	3	37.5	22
	High	6	60.0	5	41.6	5	50.0	1	10.0	2	25.0	19
	Total	10	100.0	12	100.0	10	100.0	10	100.0	8	100.0	50
Ski Jumping Racing Acrobatic	Low	4	40.0	3	25.0	2	20.0	2	20.0	5	62.5	16
	Medium	4	40.0	8	66.7	7	70.0	6	60.0	2	25.0	27
	High	2	20.0	1	8.3	1	10.0	2	20.0	1	12.5	7
	Total	10	100.0	12	100.0	10	100.0	10	100.0	8	100.0	50
Hang Gliding	Low	1	10.0	4	33.3	6	60.0	4	40.0	1	12.5	16
	Medium	5	50.0	6	50.0	4	40.0	4	40.0	3	37.5	22
	High	4	40.0	2	16.7	0	00.0	2	20.0	4	50.0	12
	Total	10	100.0	12	100.0	10	100.0	10	100.0	8	100.0	50
Skydiving	Low	5	50.0	8	66.6	3	30.0	8	80.0	4	50.0	28
	Medium	3	30.0	2	16.6	4	40.0	2	20.0	3	37.5	14
	High	2	20.0	2	16.6	3	30.0	0	00.0	1	12.5	8
	Total	10	100.0	12	100.0	10	100.0	10	100.0	8	100.0	50
Whitewater Boating	Low	2	20.0	6	50.0	3	30.0	2	20.0	4	50.0	17
	Medium	6	60.0	6	50.0	5	50.0	8	80.0	3	37.5	28
	High	2	20.0	0	00.0	2	20.0	0	00.0	1	12.5	5
	Total	10	100.0	12	100.0	10	100.0	10	100.0	8	100.0	50

and whitewater boaters and whitewater boating. Participants in the skiing category tended to rate ski jumping, racing, and acrobatic skiing medium in risk. The opposite of that which was predicted occurred in mountain climbing because the tendency of mountaineers was to give a high risk rating to mountain climbing.

It might also be expected that devotees of a particular activity would give that activity a lower risk rating in comparison to their ratings of the other four activities. Thus, of the five activities given to be rated, hang glider pilots tended to view hang gliding as the lowest in physical risk. Likewise, skydivers tended to view skydiving as the lowest in risk. However, mountain climbers and skiers viewed skydiving as the lowest in risk. Whitewater boaters viewed ski jumping as the lowest in risk.

Support for Hypothesis III

When the appropriate null hypotheses were statistically tested with analyses of variance and t-tests, only three of twenty-three variables under examination reached significance at the .05 level. Consequently, little support was generated for Hypothesis III. Therefore, in response to pain, personality, reasons for participation in recreation, and perception of risk among participants in the selected risk recreation activities, failed to be rejected.

Tests of Hypothesis IV

Hypothesis IV proposed that a relationship possibly exists between competence and perception of risk within a certain activity. It was predicted that within the Participant group there would be an inverse relationship between skill and perception of risk such that participants with high skill levels in a particular activity would perceive the risk in that activity to be low. Furthermore, participants with a low level of skill in a particular activity, might be expected to give high ratings of risk in that activity. Table 27 shows the Pearson product-moment correlations between competence and perception of physical risk in the five selected recreation activities. The only two significant ($p < .05$) correlations occurred between skill level and perceived risk in the activities of hang gliding and skydiving. Thus, those who indicated that they participated at a high level of skill in hang gliding or skydiving also indicated a low rating of risk for the respective activities.

Two of the three remaining correlations were in the predicted negative direction but were not significant. Since the correlation coefficients in hang gliding and skydiving were small, the powers of prediction in the relationship between skill level and perceived risk were severely limited.

TABLE 27

CORRELATION MATRIX FOR THE VARIABLES OF SKILL LEVEL
AND PERCEPTION OF PHYSICAL RISK IN THE
FIVE SELECTED RECREATION ACTIVITIES

Activity	r
Mountain Climbing	.18
Ski Jumping, Racing, Acrobatic	-.09
Hang Gliding	-.36**
Skydiving	-.32*
Whitewater Boating	-.05

*p<.05

**p<.01

Tests of Hypothesis V

According to Hypothesis V, a relationship possibly exists between pain threshold and pain tolerance. Table 28 indicates a low but statistically significant relationship between pain threshold and tolerance, regardless of the method of measurement. The correlation between pressure threshold and tolerance was .43 while the coefficient for the relationship between ischemic threshold and tolerance was higher at .51. The practical utility of these relationships is small. To illustrate, only 26 percent (r^2) of the variability in ischemic pain tolerance might be explained in terms of ischemic pain threshold. Thus, these coefficients are not large enough to allow predictions. In addition, the relationship between the two measures of pain tolerance was much higher than the relationship between the two measures of pain threshold.

Tests of Hypothesis VI

Given a list of forty recreation activities, subjects were asked to estimate their frequency (days per year) of participation in each. Hypothesis VI proposed that those activities examined would exhibit common relationships when factored. Factor analysis with the principle component and Varimax method was computed on the frequency of participation by 100 subjects in the forty activities. Although different number of factors and several rotations were used, no interpretable solution emerged.

TABLE 28

CORRELATION MATRIX FOR THE VARIABLES OF
ISCHEMIC THRESHOLD, PRESSURE THRESHOLD,
ISCHEMIC TOLERANCE, AND PRESSURE TOLERANCE

	Ischemic Threshold	Pressure Threshold	Ischemic Tolerance	Pressure Tolerance
Ischemic Threshold	1.00	.28*	.51**	.20*
Pressure Threshold		1.00	.20*	.43**
Ischemic Tolerance			1.00	.42**
Pressure Tolerance				1.00

*p<.05

**p<.01

Additional Analyses

Two additional analyses were made with the collected data. First, the personality trait scores of the experimental groups were compared with the population normative scores, which were established through application of the Personality Research Form on several large samples of college students. Second, on the speculation that high risk takers might have different characteristics than low risk takers, a comparison was made between all those subjects who rated themselves as high risk takers in general and all those who rated themselves as low risk takers. This latter comparison involved the variables of personality, response to pain, reasons for participation in recreation, and perception of physical risk.

Comparison of Personality Trait Scores with Population Norms

The group's mean scores for the four personality traits were compared with the percentile equivalents and standard scores of the normative group. The Personality Research Form Manual (Jackson, 1967) stated that sixty-eight percent of all subjects will have scores between forty and sixty standard score units for any given scale and about ninety-five percent will fall within a range of thirty to seventy standard score units. The mean scores of the groups ranged from 45 to 59 standard score units, well within the normative range. The percentile equivalents for the groups in the

four traits were as follows: Agression--Participants and Non-participants (29); Change--Participants (69), Nonparticipants (56); Exhibition--Participants (47), Nonparticipants (55); Harmavoidance--Participants (35), Nonparticipants (70). Since the scores of the experimental groups were within the normative range, it can be concluded that the subjects possessed normal amounts of the four traits.

High Risk Takers Versus Low Risk Takers

In a post hoc analysis, two groups of subjects were divided along the dimension of risk taking as a general characteristic. On the basis of responses to the question "In general, I am a low risk taker" (True or False), a self-rated High Risk group (N=60) and a self-rated Low Risk group (N=40) were formed. These two groups were compared for response to pain, four personality traits, reasons for participation in recreation, and perceptions of physical risk.

Response to pain. An analysis of variance was computed to test for differences in pain threshold and tolerance between the self-rated High Risk and Low Risk groups. None of the F-ratios were significant at the .05 level. Therefore, the self-rated High Risk group did not differ from the self-rated Low Risk group in either pain threshold or pain tolerance. The F-ratios for this analysis are found in Table 39, Supplementary Tables, Appendix IV.

Personality. To determine differences between the self-rated High Risk and Low Risk groups with respect to the four personality scales an analysis of variance was calculated. Table 29 presents a summary of ANOVA for the data. As can be seen in Table 29, significant differences existed between the two groups in mean scores of the scales of Change and Harmavoidance. The High Risk group had a higher mean score in the scale Change and a lower mean score in the scale Harmavoidance than did the Low Risk group. Therefore, those who were high risk takers in general were more likely to enjoy new and different experiences and enjoy exciting activities. Those who were low risk takers in general were more likely to seek routine and avoid risk of bodily harm.

Reasons for participation. The subjects ranked nine statements as descriptive of why they participated in recreation. Table 30 shows the analysis of variance between the High Risk and Low Risk groups to determine differences in the rank order of the statements. There was no significant difference in the way the two groups ranked the nine reasons for participation in recreation except for the statement on the enjoyment of accomplishment. The self-rated Low Risk takers more often ranked accomplishment as a primary reason for participation in recreation than did the self-rated High Risk group.

TABLE 29

SUMMARY OF ANOVA BETWEEN THE SELF-RATED HIGH RISK GROUP AND THE SELF-RATED LOW RISK GROUP WITH THE FOUR PERSONALITY TRAITS AS DEFINED BY THE PERSONALITY RESEARCH FORM AS DEPENDENT VARIABLES

Source of Variation	SS	df	MS	F	Self-rated High Risk		Self-rated Low Risk Group	
					Mean	S.D.	Mean	S.D.
Aggression								
Between treatments	33.96	1	33.96	3.77	5.74	3.00	3.38	3.04
Within treatments	883.28	98	9.01					
Change								
Between treatments	87.55	1	87.55	9.52*	13.00	3.03	9.20	3.16
Within treatments	901.61	98	9.20					
Exhibition								
Between treatments	9.94	1	9.94	.62	10.37	4.02	9.09	4.01
Within treatments	1583.85	98	16.16					
Harmavoidance								
Between treatments	464.05	1	464.05	44.38*	5.25	3.23	14.01	3.88
Within treatments	1024.70	98	10.46					

*p<.01

TABLE 30

SUMMARY OF ANOVA BETWEEN THE SELF-RATED HIGH RISK GROUP
AND SELF-RATED LOW RISK GROUP WITH REASONS FOR
PARTICIPATION IN RECREATION AS THE DEPENDENT VARIABLE

Source of Variation	SS	df	MS	F	High Risk Group	Ranked Order Low Risk Group
Health and Fitness:						
Between treatments	3.67	1	3.67	.55	2	6
Within treatments	647.89	98	6.61			
Freedom:						
Between treatments	10.64	1	10.64	1.89	1	1
Within treatments	552.00	98	5.63			
Skill-Testing:						
Between treatments	4.72	1	4.72	.92	3	3
Within treatments	503.47	98	5.14			
Social:						
Between treatments	24.63	1	24.63	3.82	6	4
Within treatments	632.36	98	6.45			
Vertigo						
Between treatments	17.14	1	17.14	2.57	7	9
Within treatments	652.70	98	6.66			
Aesthetic						
Between treatments	3.98	1	3.98	.66	4	5
Within treatments	594.21	98	6.06			
Power:						
Between treatments	3.01	1	3.01	.48	8	8
Within treatments	610.63	98	6.23			
Ascetic:						
Between treatments	.03	1	.03	.01	9	7
Within treatments	650.40	98	6.64			
Accomplishment:						
Between treatments	24.25	1	24.25	4.30*	5	2
Within treatments	552.11	98	5.63			

* $p < .05$

Perception of Risk. The physical risk involved in the five selected outdoor recreation activities was rated by each of the subjects as high, medium, or low. Table 31 shows the analysis of variance for the results of these ratings.

TABLE 31

SUMMARY OF ANOVA BETWEEN THE SELF-RATED HIGH RISK GROUP
AND SELF-RATED LOW RISK GROUP WITH PERCEPTION OF
RISK AS THE DEPENDENT VARIABLE

Source of Variation	SS	df	MS	F
Perceived Physical Risk in the Activity:				
Mountain Climbing				
Between treatments	3.86	1	3.86	8.33*
Within treatments	45.38	98	.46	
Ski Jumping, Racing, Acrobatic				
Between treatments	.03	1	.03	.06
Within treatments	45.93	98	.47	
Hang Gliding				
Between treatments	.15	1	.15	.26
Within treatments	56.41	98	.58	
Skydiving				
Between treatments	.40	1	.40	.66
Within treatments	58.60	98	.60	
Whitewater Boating				
Between treatments	.25	1	.25	.59
Within treatments	41.19	98	.42	

*p < .01

The only significant difference in perceived physical risk between the two groups was for the activity of mountain climbing. The group that evaluated themselves as high risk takers perceived mountain climbing to be higher in physical risk than did the self-rated low risk takers.

Table 32 gives a breakdown as to how the two groups rated the physical risk involved in each of five activities. The percentages were based on the frequency of subjects that estimated the physical risk as high, medium, or low. All the subjects tended to rate the activities medium in physical risk with the exception of mountain climbing. This activity was rated high risk by 48 percent of the self-rated High Risk group while only 30 percent of the self-rated Low Risk rated it high risk. These percentages support the finding of a significant F-ratio in the above analysis of variance.

Support for the additional analysis. Four significant differences at the .05 level were found in the examination of twenty-two dependent variables in the self-rated High Risk group versus Low Risk group comparison. Thus, there was some evidence that the self-rated High Risk group differed from the self-rated Low Risk group in personality, reasons for participation in recreation, and perception of physical risk.

TABLE 32

FREQUENCIES AND PERCENTAGES OF PHYSICAL RISK RATINGS IN THE FIVE SELECTED
OUTDOOR RECREATION ACTIVITIES BY THE SELF-RATED HIGH AND LOW RISK GROUPS

Recreation Activity	Amount of Perceived Physical Risk	Self-rated High Risk Group		Self-rated Low Risk Group		Total
		Number	Percent	Number	Percent	
Mountain Climbing	Low	5	8.3	10	25.0	15
	Medium	26	43.3	18	45.0	44
	High	29	48.3	12	30.0	41
	Total	60	100.0	40	100.0	100
Ski Jumping Racing Acrobatic	Low	14	23.3	10	25.0	24
	Medium	34	56.7	19	47.5	53
	High	12	20.0	11	27.5	23
	Total	60	100.0	40	100.0	100
Hang Gliding	Low	13	21.7	10	25.0	23
	Medium	26	43.3	19	47.5	45
	High	21	35.0	11	27.5	32
	Total	60	100.0	40	100.0	100
Skydiving	Low	23	28.3	12	30.0	35
	Medium	24	40.0	16	40.0	40
	High	13	21.7	12	30.0	25
	Total	60	100.0	40	100.0	100
Whitewater Boating	Low	17	28.3	13	32.5	30
	Medium	34	56.7	22	55.0	56
	High	9	15.0	5	12.5	14
	Total	60	100.0	40	100.0	100

CHAPTER V

DISCUSSION

The main purpose of this study was to determine differences between Participants and Nonparticipants in high risk recreation in terms of the following factors: response to pain, personality variables, reasons for participation in recreation, and perception of risk. Six hypotheses were generated to test for these differences. The results were reported in Chapter IV. This chapter discusses those results and attempts to explain some of the variability in the data.

Response to Pain

Differences were predicted between Participants in risk recreation and Nonparticipants in response to pain. According to Sternbach (1968), the child afflicted with pain-free senses tends to be more active, possibly because he has not found his physical limits. Likewise, it was thought that high risk participants would have high pain thresholds and tolerances and would more likely be attracted to those activities in which physical limits might be tested. Thus, as predicted, Participants did have a significantly higher mean pain tolerance than Nonparticipants, and while Participants also had a higher pain tolerance than Nonparticipants "No Interest", Partici-

pants did not differ from Nonparticipants "With Interest". It appears from these results that pain response may affect a person's choice of certain types of recreation activity. These findings are similar to those by Ryan and Kovacic (1966) and Walker (1971) who found that athletes differed in pain tolerance from nonathletes.

Differences in ischemic pain tolerance were found to be significant in this investigation while no differences were found between Participants and Nonparticipants in pressure pain tolerance or in pain threshold. In a study by Ryan and Kovacic (1966), the groups of contact sport athletes, noncontact sports athletes, and nonathletes differed in pain tolerance but not in pain threshold. The conclusion based on that research was that pain threshold is probably associated with physiological components and that pain tolerance is associated with psychological components. Thus, the differences in pain tolerance among the groups were likely the result of cultural or environmental influences. The same conclusion might be made in this study regarding the difference in pain tolerance between participants in risk recreation and nonparticipants.

In analyzing the variance in ischemic pain tolerance among the Participant group and the two subgroups of Nonparticipants, a greater amount of variance was due to the variable of participation rather than to the interest-to-participate variable. Thus, it cannot be determined whether a person learns to tolerate pain through participation

in risk activities or whether he is drawn to risk recreation because he can more easily tolerate pain.

Although a difference in ischemic pain tolerance was found, no difference among groups was found in pressure pain tolerance. A number of situational or task influences may have affected a subject's pain tolerance as tested in the laboratory. Such possibilities as instrument difficulties, information processing strategies, and cultural and environmental influences are discussed.

Instrument difficulties may have accounted for some of the variance. Midway through the experiment it was determined that the pressure cuff had developed a leaky valve. This could have affected the gross pressure procedure more than the muscle ischemia measure. In the latter, tolerance was determined by time in seconds for duration of the stimulus at a constant 200 mm Hg. In spite of a leaky valve, a constant pressure at that level could still be maintained. However, in the gross pressure procedure, tolerance was measured in mm Hg pressure. The rate of inflation and, therefore, application of pressure were not consistent due to the valve malfunction.

Slovic (1972) proposed that situational determinants may be more important in influencing pain behavior than any organismic characteristics. The ability to tolerate pain may reflect the ability of certain subjects to utilize information processing strategies such as focusing on a particular object, talking, or tapping rhythms. Previous studies have reported this effect (Kanfer,

1966; Janis and Feshbach, 1954). Many of the subjects in this investigation exhibited such behaviors. Thus, by attending to some other stimulus, the painful stimulus could have been ignored.

Another form of testing strategy might also have affected the pain tolerance readings. In second-guessing what the experiment was trying to prove, the Participants may have thought the pain test was for masochism while the Nonparticipants thought it was for "manliness". To counteract the stigma of masochism attached to risk activity enthusiasts, subjects in the participant classification may have subjectively lowered their tolerance by withdrawing from the stimulus early. This was evidenced by a greater frequency of participant subjects reporting that they could have endured the pain longer but did not feel like doing so. In contrast, the subjects in the Nonparticipant group may have made an extra effort to bear the pain for fear of appearing "unmanly". Zborowski (1952) termed this phenomenon pain acceptance, and as a cultural value, pain tolerance may be considered more socially beneficial by some groups than by others.

Past experiences with pain may differentially affect tolerance. The Participants, having had more experience with these types of pain and having had instructions dealing with pain in the course of training, may possibly have viewed the pain tests in this study as less harmful. The Nonparticipants, on the other hand, may have had limited experiences with these types of pain and possibly were more

likely to consider the test procedures to be harmful.

Pain tolerance is possibly a situation-specific response depending on present states of the individual as well as past experience. Thus, a person may undergo painful experiences in his chosen activity but exhibit low pain tolerance in the laboratory. There may be a chemical explanation as with the theory of risk exercise (Furlong, 1969), for people have attributed many feats to the extra energy from adrenalin in danger or risk situations. Goals and incentives may also affect an action. In an activity such as mountain climbing, much pain may be endured so the individual can reach the summit and a panoramic view. Discomfort is not sought (Houston, 1967), but it is endured as part of the challenge. In other words, the ultimate goal of the stress seeker is pleasure, but in seeking this goal, other stresses such as pain may have to be experienced (Klausner, 1968). Therefore, masochism is not a descriptive characteristic of the stress seeker because pain itself is not sought. Alvarez (1967: 12) illustrates this in the following statement:

Flirting with danger for kicks bores me; it is a form of exhibitionism, a vulgarity to one's self. I would no more climb or drive fast cars in order to hurt myself, than I would play poker to lose. The pleasure is in doing something different, something that extends your concentration and effort and resourcefulness without ever losing control.

The laboratory situation for testing pain may not have been representative of a stress seeking experience. In the laboratory, the

goal was to endure the pain induced by a sphygmomanometer. No mountain summit with a panoramic view existed.

As suggested earlier, the influence of information processing strategies may be a factor in pain tolerance. To complete a difficult climbing maneuver, the mountain climber must exert total concentration and commit himself to the move. Thus, extraneous stimuli such as pain can be shut out.

Response to pain is a multifaceted dimension which is affected by environmental, cultural, social, and psychological states. The results of this study suggest that there are many more determinants of activity choice than the limits set by pain.

Personality

Previous research (Cooper, 1969; Howard, 1976; Martin and Myrick, 1976; Brunner, 1969; Ibrahim, 1969) has consistently found differences in personality and participation preference in physical activity. In the four traits tested in this investigation, Harmavoidance and Change were the only ones that were found to be different between groups. Participants scored much lower than Nonparticipants in Harmavoidance, indicating that those involved in the high risk activities were less fearful, less pain avoidant (supported by higher pain tolerances), less likely to avoid risks, and more likely to enjoy exciting activities. It follows then, that participants engaged in activities in which danger, risk, and fear are prevalent possess personalities to

deal with those factors.

It is concluded that people who participate or have the interest to participate in high risk activities will not likely have a trait expressing avoidance of harm or risk.

Petrie et al. (1962) found that many perceptual reducers (see Review of Literature) suffered from lack of stimulation and predicted such people would need change, movement, and speed. It may be assumed that high risk activities satisfy this need since they are novel and require technical and precise movements. Many are loaded with the element of speed, and all of these factors compound the risk. This study did not find that Participants had higher scores in the personality category of Change than did the Nonparticipants. However, it was found that both the "With Interest" subgroup of Nonparticipants and the Participant group scored higher than did the "No Interest" subgroup in the trait of Change. Thus, it appeared that a personality factor displaying a need for change might differentiate people that would be interested in taking up a high risk sport.

The claims that eustress seeking sports are outlets for both "show off" tendencies and aggression (Bernard, 1968) were not substantiated by the findings of this study. No differences in the traits Aggression and Exhibition were found in any of the group comparisons.

In both the pain and personality sections of this experiment, no cause and effect relationships were inferred. A person may engage in a certain activity because he has a high tolerance for pain or because of a personality predisposition to do so. On the other hand, a person may gain these attributes, either tolerance for pain or personality traits, through actual participation. There may also be certain personality traits that make a successful participant or competitor. Kroll (1967) theorized several ways in which personality may be linked to physical activity preference. First, similar sets of personality traits may exist in people attracted to certain types of activities. However, only those possessing a particular combination of those traits continue in the activity and become successful. Thus, both beginners and veterans have similar patterns of personality, but the difference is in intensity of the features. Secondly, beginners in an activity may possess dissimilar patterns of personality features, but the veterans have similar patterns. In other words, there may be no pattern that attracts a person to an activity, but either through modification of the personality or attrition of certain patterns only those people with a particular set of traits become successful. Thirdly, similar personality patterns may motivate entry into certain activities but participation and attrition result in dissimilar patterns in veterans. Finally, both beginners and veterans in a certain activity may possess nondiscriminant patterns.

In one experiment with modification of personality in a stress activity, Daniel (1973) reported that the personalities of skydivers were altered through adaptation to stress conditions. Since the study tested first-jump skydivers versus experienced skydivers and was not longitudinal, the results were not conclusive that the personalities of the experienced skydivers had actually changed. Thus, the greater degree of the traits in question may have been there to begin with, and that set of features were what motivated those individuals to continue jumping.

The cause and effect of psychological and physiological bases of pain tolerance and personality were not under investigation in the present study. However, differences in personality and response to pain between high risk activity participants and nonparticipants were under examination. With respect to these groups, differences in pain tolerance and Harmavoidance were found to be the most salient. Although these two variables, pain response and personality, are related in theory, it is not known if they interacted to produce the differences reported in this study. Participation or the interest to participate in high risk recreation may be explained in part by pain tolerance, personality variables, or even some factor not specifically covered by this design, e.g., perceptual modes.

Reasons for Participation in Recreation

Choice of recreation and performance style may be related to or affected by the person's view of his relationship to the outside world. Assuming that what man finds meaningful is connected to what he finds interesting, those recreation activities in which one indicates interest must provide him with unique meanings. Reasons for participation in recreation might be identified with basic patterns of leisure behavior. Thus, it was predicted that Participants in risk recreation would have different sources of meaning and enjoyment in activities than would Nonparticipants.

Participants in risk recreation differed from Nonparticipants in that they ranked aesthetics as a primary source of satisfaction in recreation while the Nonparticipants ranked the social aspects as a primary source. The Participants also placed greater value in vertigo as a source of enjoyment. All subjects, regardless of group classification, indicated the value in recreation to be opportunities for a feeling of freedom, skill-testing, and health and fitness. (For an overall look at how each group ranked the nine statements refer to Table 40, Supplementary Tables, Appendix IV).

In analyzing the variance among the Participants and the two subgroups of Nonparticipants, the difference in reasons for participation in recreation appeared to be related mostly to the participation variable as opposed to the interest-to-participate variable.

It logically follows, then, that the differences in the reasons for participation reflect the nature of the chosen activities of the subjects. Although the one group was labeled Nonparticipants, this did not signify that they were nonparticipants in recreation. Rather, they had never engaged in any of the five selected risk activities. They were active participants in other types of recreation, including bicycling, hiking, fishing, and intramural sports.

Since all the subjects indicated great satisfaction derived from freedom, skill-testing, and health and fitness in recreation, the results suggest that the same meanings or satisfactions can be obtained from different activities. To illustrate, both a mountain climber and a cyclist could list a sense of freedom as the primary source of satisfaction in their respective pursuits. However, according to Coutts (1968:70), this feeling of freedom can be experienced differentially:

One basic underlying reason why man engages in sport is the sense of freedom which he finds. Nongame sports, such as mountain climbing, skiing, and sky diving, allow for a greater feeling of being free in the sense of being dependent on self for survival or success and in providing for more creative expression through choices and actions.

Likewise, the enjoyment of skill-testing was ranked as a primary reason for participation in recreation by all subjects. The satisfaction may be different, though, depending upon the

situation in which it is experienced. The high ranking may reflect a need for each person to test himself in order to find one's limits or to better know oneself. In testing one's skills, some people prefer that the challenge of uncertainty or risk be involved. Others just as easily can test themselves without the risk context. Thus, each person finds a unique way in which to test his limits or skills.

This philosophy of self-knowledge through challenge is the basis for the Outward Bound program. Organized around a risk activity (e.g. mountain climbing, canoeing, ocean sailing), each school provides adventure in an outdoor setting which imparts a sense of thrill in danger, exhilaration, control, confidence, and self-satisfaction to the individual. The participant stretches his capacity to learn, as stated in the Outward Bound brochure, that "there are no limits to his efforts, unless he limits himself." These learning experiences are then theorized to have carryover value to daily activities.

The risk activities may provide unique opportunities to experience aesthetic and vertigo satisfaction, and thus, the Participants in risk recreation ranked the respective statements higher. The opportunity to find beauty, either in scenery or movement, in the five selected recreation activities is evident. The graceful bird-like flight in hang gliding and skydiving, the precise control of movement in skiing and whitewater boating, and the "ballet of the

crags" have been well documented. Although beauty can be viewed from attainable summits, perhaps the vista of beauty from a challenging summit may somehow be more rewarding. Thus, elements of both aesthetics and vertigo may combine as a source of enjoyment in the risk activities.

In summary, the results suggest that the same activity can provide a variety of meanings to its participants and also that the same meanings can be derived from different activities. Exactly what meanings or satisfactions a person will encounter when he participates in a certain activity cannot be stated. However, according to Stone (1972:191), the stress sports are among those activities in which a person may meet with "his phenomenological world, his self, and the experiences of competence, risk taking, and speed, and that he will experience these and formulate meanings from them in ways and of a sort uniquely his."

Perception of Risk

Individual differences in stress seeking occur partially because of divergent evaluations of stress and risk (Torrance, 1973; Stone, 1972; Slovenko and Knight, 1967; Kogan and Wallach, 1967). The findings of this study supported this premise since differences in perceptions of risk were found in many of the comparisons among groups and subgroups.

Much of the difference in evaluation of risk is associated with variant contexts in which it is viewed. Objective risk, the actual probability of loss, is markedly different from subjective risk, which involves a person's values about that loss. Thus, it cannot be distinguished whether the choice to participate in activities which entail a large amount of objective risk is due primarily to individual differences in the perception of risk or to reactions to that perceived risk. To complicate matters further, such factors as danger, fear, and skill interact to produce inconsistent results.

Participants in high risk activities, having a realistic knowledge of probabilities of injury or death, very likely viewed risk in objective terms (probability of success or failure), and therefore, their rated perceptions of physical risk were usually lower. Non-participants, on the other hand, had higher ratings of perceived physical risk which was perhaps based on their perceptions of subjective probabilities of failure. Thus, the orientation of the two groups may have differed in direction with the Participants tending to view the risk in terms of probability of success and the Non-participants viewing it in terms of probability of failure. In addition, subjective utility of that failure may have affected the estimation risk by the students.

The context of subjective risk may help to explain why these selected activities are often labeled as high risk when the objective risk may actually be low. One consideration is the probability of severe injury. For example, sport parachuting may have a relatively low accident rate, but given an injury, it is very likely to be severe, e.g., death. There is very little margin of error in activities like mountain climbing, skydiving, and hang gliding, and this affects the stakes, or the subjective utility of participation. In addition, the subjective value of a death resulting from a skydiving accident is spectacular and presents a graphic image to the public mind. The death can also be directly associated with the act of skydiving itself. In some other sports such as football the death is not as spectacular. The death may not be directly associated with the football game because the injured football player usually dies later in a hospital of head or neck injuries. A death in football may even be more culturally acceptable because football is the all-American game, whereas "only bird excretion and fools fall from the sky."

Risk may also be discussed in terms of autonomic stimulation which is aroused by emotions such as fear. According to Fiske and Maddi (1961), the individual constantly seeks some optimal level of internal excitement. Stress seeking is a behavior undertaken in order to raise the amount of excitation when it drops below the optimal level

and avoided when the excitation becomes excessive (Berlyne, 1960; Leuba, 1955). This "arousal jag" produces pleasure for some, and the opportunities for achieving the jag may be more abundant in sport. Klausner (1968) proposed that fearful and pleasurable experiences are intertwined because pain and pleasure are drawn from a common general substrate of excitement. The arousal jag may be experienced differentially depending upon environmental circumstances. Therefore, in some instances the individual may interpret the excitement as positive and at other times negative. The interpretation, in turn, affects approach or avoidance behavior (e.g., choice of activities).

Klausner (1968) also theorized that as one moves through a stress experience, the excitement which initially may seem painful may be interpreted in the end as pleasure. Smith (1976) illustrated this premise with the example of marathon swimming. The four stages of long-distance swimming, he found through interviewing the participants in the activity, were hurt, pain, agony, and pleasure. In addition, the pleasure was described as euphoria; a similar description of the exhilaration has been propounded to exist in risk sports.

Risky behaviors may not be entered upon within the same perspective. Nonparticipants may not have calculated ideas of probabilities of success or failure so they may base subjective values on a sense of danger which may be interpreted as fear. The Participant group, perhaps in the context of objective risk, rated the activities to be

lower in danger or physical risk. Through their skill, the probability of success may increase, and the risks become calculated ones. On the other hand, the Nonparticipants likely based their ratings of physical risk on subjective values and utility. Therefore, the difference in estimations of physical risk may reflect dissimilar evaluations of controllable danger. In the view of the Participant much of the so-called danger is reduced to a calculated risk. In contrast, Nonparticipants, especially those with no interest to participate in risk recreation, may view the activities to be uncontrolled risks or dangerous. It logically follows, then, that the "With Interest" subgroup of Nonparticipants gave reasons of lack of time or money as to why they did not participate in the selected risk activities while the primary reason given by the "No Interest" subgroup was that of fear of injury or death.

The prospect of physical injury, real or perceived, is a large source of fear, and this in part determines the pain or pleasure interpretation of arousal. Marshall (1968) claimed that fear acts as a brake on the cortex. Since cortical stimulation brings about activation through arousal, fear may alter this. If an optimum level of activation is necessary for task performance, then fear can effect performance. Thus, successful performance in risk recreation activities or stress sports depends upon control of fear. Studies by Fenz (1964; Fenz and Jones, (1972); and Fenz and Epstein, (1969) reported that arousal and reports of fear were greatest early in

the jump sequence and greater for novice skydivers than for experienced skydivers. It was concluded that through instruction and practice, skydivers learned to control fear. Participant subjects in this study support these conclusions since they reported that knowledge of self through skill controlled fear and also lowered their estimation of risk.

Skill

In a study of automobile drivers (Dunlap et al., 1953), it was predicted that the probability a driver would attempt a risky act would be inversely related to his estimation of the risk involved. Furthermore, if his estimation of the risk were low, his level of fear would be also. In terms of the present study, more subjects who chose risky activities had lower perceptions of risk and also lower reports of the fear and danger involved. It is not known whether they had these characteristics as propensities for making the choice to participate or whether they gained them through skill instruction and conditioning to ensure successful performance. Since the "With Interest" subgroup of Nonparticipants had many of the same characteristics as the Participant group, it would appear that interest to participate in risk recreation more than the actual participation is related to the characteristics of perception of risk and personality.

Skill is another factor which will affect the perception of risk through the interaction of probability of success and failure with outcome utility. Lack of skill increases the likelihood of judgmental errors which decrease the probability of success. Statistics show higher accident rates for novices in skydiving (Hughes, 1976), whitewater boating (Hartline and Hartline, 1976), mountain climbing (American Alpine Club, 1976), and skiing (Gutman et al., 1974).

The relationship of skill and perceived amount of risk was examined in two ways in this investigation. First, in the comparison among the activity subgroups it was predicted that the participants in each activity would perceive their activity to be lower in risk as compared to the other activities. Thus, skydivers would rate skydiving to be lowest, skiers rate skiing to be lowest, and so forth. Results showed that this was only a significant occurrence in the activity of hang gliding. In addition to the small sample size of the activity representatives, the results were affected by participants being active in more than one of the selected areas. Thus, the subjective and objective probability and estimation of risk were confounded by skill level in multiple activities.

The second test involved a correlation between skill level and perceived risk within the Participant group alone. This, in essence, assumed that all those who participated at an advanced level in a

particular activity would have a lower perception of risk for that activity and a beginner would have a high perception of risk. Although this method allowed for multiple participation in activities, the results were still not of significant utility. All of the correlations were in the predicted direction with the exception of mountain climbing, but the coefficients for hang gliding and skydiving were the only variables to reach statistical significance. This possibly is a reflection that skydiving and hang gliding tend to be consuming recreation interest in that enthusiasts of these activities take part in little else. Thus, those who indicated skill in either of these two activities also probably did not indicate active participation in a number of other activities. The small sample size and restriction of the entire range of skill level may have greatly affected the results by spuriously lowering the correlation. Another consideration is that participation at any skill level will very likely increase the probability of success and thus reduce the estimation of risk.

One skydiving instructor described the relationship between skill and risk by saying that there are three types of people who view a sport as high risk: those who know nothing at all about the sport and are afraid of both the activity and the participants; those who know just enough about the sport to be dangerous by confusing danger and controllable risk; and those who are very skilled and have participated

for so long that they are in awe of the sport and possibly have witnessed the consequences of their friends' errors.

Other Considerations

On the speculation that high risk takers might have different characteristics than low risk takers, the subjects of this study were divided accordingly on the basis of a true or false response to the question, "I am a low risk taker in general." The parameters of risk taking have been studied in terms of gambling (Kogan and Wallach, 1964), achievement motivation (McClelland et al., 1953), and demographic variables (Slovic, 1964; Cecil, 1972). Much concern has been generated as to the validity of the claim that risk taking is a generalized disposition.

If the proposition were made that risk taking was a general characteristic, then it would be predicted in this study that those who reported themselves to be high risk takers in general would differ from those who reported themselves to be low risk takers. In addition, those engaged in occupations or sports in which the objective risk may be small but the stakes high (e.g., test piloting, mountain climbing) are considered to be high risk takers (Kogan and Wallach, 1967). Thus, it would be predicted that the self-rated High Risk group would consist largely of Participants in risk recreation and thus manifest similar characteristics.

The results showed that the self-rated high risk takers in comparison to the self-rated low risk takers were younger and had personality characteristics of high need for change and low need to avoid harm. The self-rated High Risk group also ranked the feeling of accomplishment as more enjoyable and rated mountain climbing higher in physical risk. Other studies have found differences in age and a risk disposition (Kogan and Wallace, 1967; Botwinick, 1969), with younger people more consistent in risky choices. Consequently, the findings of the present investigation support these studies.

The self-rated High Risk group was most like the Participant group in personality characteristics. As was predicted, the self-rated High Risk group showed greater enjoyment of exciting activities and greater need for change and novelty. A number of previous investigations found relationships between personality variables and a propensity for risk.

The only significant difference in the ranking of reasons for participation in recreation was for the statement regarding a feeling of accomplishment. A difference in ranking of this particular statement did not reach significance in any of the other intergroup comparisons. McClelland and associates (1953) examined in depth the motivational determinants of risk taking behavior and hypothesized that the achievement motive, a class of incentives producing a feeling

of accomplishment, is most directly concerned with a risk taking propensity. In their model, approach or avoidance of a task is partially determined by the strength of one's motive to achieve or accomplish.

In the present study the self-rated Low Risk group more often ranked the feeling of accomplishment to be the primary reason for participation in recreation than did the self-rated High Risk group. However, no specific comparison between these results and the Atkinson-McClelland model can be drawn since the relationship between strength of achievement motive and ranking of accomplishment is not known. Nevertheless, the factors of accomplishment and achievement may be implications of risk taking behavior.

The deficiency in the Atkinson model, according to Kogan and Wallach (1967) and Quandt (1973), is the interrelationship between skill and risk. In predicting high achievement motivation/moderate risk taking, Atkinson assumed that the population was homogeneously skilled. The present study consisted of a heterogeneously skilled sample which may account for some of the variance in the data. Probability of success or level of difficulty in specific tasks is often determined by group averages. Individual variations are not controlled, and therefore, what may be viewed as intermediate difficulty or moderate risk by one person might well be easy or low risk for another. Consequently, subjects may have been examined

under a standard of high risk other than their own. Referring to the previous discussion on skill and risk in Hypothesis IV, the relationship between skill and perceived risk was not clarified. As noted, this was probably due to the different contexts of risk and skill in recreation activities and a lack of control over individual factors.

A major caution in interpretation of the results of this section must be kept in mind. The division of the subjects into the High Risk and Low Risk groups was based on a self-evaluation by each subject. However, since self-perceptions tend to be biased toward cultural values (Slovic, 1964; Wallach and Wing, 1968), it becomes unclear whether high risk takers are in greater need of changes in routine and adventure in risky activities or whether just those who report themselves to be high risk takers have those personality characteristics. Thus, the use of self-ratings for measurement of risk disposition and skill level may have biased the results.

In addition, a general propensity toward risk taking (real or perceived) may not be a stable element of the population. According to Gergen (1973:309), "Theories of social behavior are primarily reflections of contemporary history." Thus, results of social psychology experiments may apply only for a specific point in time. The findings of such experiments change as the forces in society alter the characteristics, motives, and needs of the people.

Alsop (1970) proposed that a characteristic such as risk taking is extremely susceptible to cultural pressures. Because of the effects of television and popular culture, he states that today's society is characterized by "Waltermittyism."¹ Thus, while a person's overt behavior may be cautious, he may possess a personality dimension of fantasied riskiness. In the sample of the present study a greater number of subjects evaluated themselves as high risk takers, possibly a reflection of a greater proportion in today's society. This phenomenon may also partially account for the increased numbers of participants in the high risk activities. While some people retreat to a fantasy world to find the needed influence of risk in their lives, others may turn to recreation as a socially acceptable way to seek eustress or risk.

Throughout the discussion in this chapter, stress seeking or risk taking has been delineated to be a multifaceted dimension. This dimension has implications for perception, personality, and response to pain. Within this dimension there are a variety of objective and subjective components, and these, in turn, are susceptible to a variety of motivational and situational influences. Thus, a

¹The term is based on a short story by James Thurber, "The Secret Life of Walter Mitty," in which the main character is a meek, submissive man who retreats to a fantasy world to live as a dashing hero.

unidimensional model to account for multidimensional behavior is inadequate. Although the results of this study demonstrated differences between participants in risk recreation and nonparticipants with respect to pain tolerance, personality characteristics, reasons for participation in recreation, and perceptions of risk, the bases for these differences are not clear. Therefore, while stresses seeking through risk recreation is evident in today's society, more study is merited to determine the mechanisms responsible for these differences and the functions performed by them.

CHAPTER VI

SUMMARY, FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The problem in this study was to investigate differences between Participants in risk recreation and Nonparticipants with respect to the variables of pain response, personality, reasons for participation in recreation, and perception of risk. The Participant group was represented by enthusiasts in the activities of mountain climbing (N=10), ski jumping, racing, or acrobatic skiing (N=12), hang gliding (N=10), skydiving (N=10), and whitewater boating (N=8). These activities were selected to typify high risk in recreation pursuits as based on the literature and the probability of severe injury through error by the participant. The Nonparticipant group was divided into two subgroups; those who indicated an interest in participating in the above activities and those who indicated no interest.

One hundred male students at the University of Montana were administered muscle ischemia and gross pressure pain response tests with a sphygmomanometer to determine pain threshold and tolerance. In addition, data about personality (Aggression, Change, Exhibition, and Harmavoidance scales from the Personality Research Form), reasons for participation in recreation, perception of risk, and

frequency of participation in other recreation activities were collected by questionnaire.

Following are the six predictions and the statistical analyses utilized to test the appropriate null hypotheses:

1. There are significant differences between Participants in risk recreation and Nonparticipants with respect to pain threshold and tolerance, personality traits, reasons for participation in recreation, and perception of risk (ANOVA).
2. There are significant differences in pain response, personality traits, reasons for participation in recreation, and perception of risk among Participants in risk recreation, Nonparticipants who have an interest to engage in risk recreation, and Nonparticipants who do not have the interest (ANOVA).
3. Within the risk recreation Participation group, there are significant differences among mountain climbers, ski jumpers (racers, acrobatic skiers), hang glider pilots, skydivers, and whitewater boaters with respect to response to pain, personality traits, reasons for participation in recreation, and perception of risk (ANOVA, t-test).
4. There is a negative relationship within the Participant group between individual skill level and perception of risk in the five selected recreation activities (Pearson Product-moment).
5. There are positive relationships between ischemic pain threshold and tolerance; between gross pressure pain threshold and

tolerance; between pressure pain threshold and ischemic threshold, and between pressure pain tolerance and ischemic tolerance (Pearson Product-moment).

6. A pattern of intercorrelations exists among the frequencies of participation by the subjects in forty recreation activities (Factor Analysis).

Findings

The findings revealed the following information regarding the response to pain by individuals:

1. Participants in risk recreation had a significantly higher ischemic pain tolerance than did Nonparticipants.

2. Participants in risk recreation had the highest ischemic pain tolerance, Nonparticipants with no interest to participate in such activities had the least ischemic tolerance, and those Nonparticipants with the interest to participate were in between.

3. There were no significant differences in ischemic pain tolerance among the participants of the five selected outdoor recreation activities.

4. There were no significant differences in pain threshold or pressure pain tolerance in any of the group comparisons.

Findings dealing with the personality traits as defined by the Personality Research Form revealed the following:

1. Participants in risk recreation scored significantly lower in Harmavoidance than did the Nonparticipants. A high scorer in Harmavoidance may be described as not enjoying exciting activities, especially if an element of danger is involved and avoiding risk of bodily harm.

2. Both the Participant group and the "With Interest" subgroup of Nonparticipants scored significantly lower in Harmavoidance than did the "No Interest" subgroup of Nonparticipants.

3. Both the Participant group and the "With Interest" subgroup of Nonparticipants scored significantly higher in the trait of Change than did the "No Interest" subgroup of Nonparticipants. A high scorer in Change may be described as liking new and different experiences and disliking routine.

4. Among the participants in the five selected outdoor recreation activities, only the trait of Harmavoidance achieved significance. Whitewater boaters scored significantly higher than did the enthusiasts of the skiing category.

5. There were no significant differences in the traits of Aggression and Exhibition in any of the group comparisons.

Findings dealing with reasons for participation in recreation derived from the rankings of nine statements were as follows:

1. Participants in risk recreation ranked freedom, aesthetics, and testing of skills to be the three primary reasons for

participation in recreation. Nonparticipants ranked freedom, social interaction, and testing of skills to be their three primary reasons. Participants indicated recreation to have greater vertigo value while the Nonparticipants indicated greater power and ascetic values in recreation.

2. Participants in risk recreation ranked vertigo and aesthetics to be greater values in recreation than did either of the two subgroups of Nonparticipants. The "With Interest" subgroup of Nonparticipants ranked power and aesthetics to be greater values in recreation than did the Participant group.

3. Among the participants in the five selected outdoor recreation activities, only vertigo was ranked significantly different. Both mountain climbers and ski jumpers ranked vertigo to be a greater value in recreation than did whitewater boaters.

The findings revealed the following information regarding the perception of risk by the subjects.

1. A greater proportion of Participants in risk recreation described themselves in general as high risk takers while a greater proportion of Nonparticipants described themselves as low risk takers.

2. Both Participants in risk recreation and those Nonparticipants who had the interest to participate tended to describe themselves in general as high risk takers while those Nonparticipants who had no interest to participate in such activities described themselves as low risk takers.

3. Among the participants in the five selected outdoor recreation activities, no significant difference occurred in the perception of risk as a general characteristic.

4. The Participants in risk recreation rated the activities of ski jumping (racing, acrobatic), hang gliding, and skydiving to be lower in physical risk than did the Nonparticipants.

5. Participants in risk recreation rated the activities of ski jumping (racing, acrobatic) and hang gliding to be lower in risk than did the "No Interest" subgroup of Nonparticipants. Both the Participant group and the "With Interest" subgroup of Nonparticipants rated the activity of whitewater boating to be significantly lower in physical risk than did the "No Interest" subgroup of Nonparticipants. The Participant group rated skydiving to be significantly lower in physical risk than did either of the subgroups of Nonparticipants. The "With Interest" subgroup of Nonparticipants, in turn, rated skydiving to be lower in physical risk than did the "No Interest" subgroup.

6. Among the participants in the five selected outdoor recreation activities only the physical risk in the activity of hang gliding was rated significantly different. Both mountain climbers and whitewater boaters rated hang gliding to be higher in physical risk than did the hang glider pilots.

Findings regarding a relationship between individual skill level and perception of physical risk in each of the selected activities were as follows:

1. There was a significant negative relationship between individual skill level and perception of physical risk in the activity of hang gliding.

2. There was a significant negative relationship between individual skill level and perception of physical risk in the activity of skydiving.

The findings revealed little information regarding a pattern of relationships among the subjects and the types of activities in which they chose to participate. When the frequencies of participation in forty recreation activities were factored, no interpretable solution emerged.

Conclusions

Based upon the analysis of the data, the following conclusions seem warranted:

1. Participants in risk recreation differed significantly from Nonparticipants with respect to pain tolerance, personality characteristics, reasons for participation in recreation, and perceptions of risk.

2. There were significant differences in pain tolerance, personality characteristics, reasons for participation in recreation, and perceptions of risk among Participants in risk recreation, Nonparticipants who have the interest to participate, and Nonparticipants who do not have the interest. This conclusion was based on the findings of the analyses of variance among the three groups revealing that most of the differences in the variables under examination occurred between the Participant group and the "No Interest" subgroup of Nonparticipants. Although no causal linkage can be established, the results implied that differences in personality characteristics and perceptions of risk were influenced more by an interest to participate in risk recreation rather than by the act of participation itself. On the other hand, differences in pain tolerance and reasons for participation appeared to be influenced more by the participation variable rather than by the interest-to-participate variable. Some of the differences may also be accounted for by an interaction of the two variables.

3. Since few differences were found among the participants in the five selected outdoor recreation activities, it was concluded that with respect to the variables under examination the Participant group was a homogeneous sample of risk participants.

4. Perception of risk was not dependent upon any one specific factor but rather upon a combination of variables, including individual skill level, an understanding of the actual probability

of success in the activity, and whether or not one already participates in the activity or has an interest to participate.

5. A significant relationship existed between pain threshold and tolerance, regardless of the type of measurement. However, the small correlation coefficients prevented predictions in either direction of this relationship.

6. The findings failed to support the prediction that factors could be extracted from the reported frequencies of participation in forty recreation activities by the one hundred sample subjects.

Recommendations

Recommendations for further study are as follows:

1. A complete personality assessment instrument should be used on a similar sample of subjects to provide profiles of personality and a wider perspective on personality and recreation preference. In addition, the perceptual characteristics of risk recreation participants should be investigated.

2. Measurement of pain threshold and tolerance utilizing a greater variety of testing methods and functioning instruments is needed to further explore the relationship between response to pain and recreation preference.

3. Repetition of the experiment in different geographic regions would allow expansion of the risk recreation category to include such activities as surfing, scuba diving, water ski jumping, and

hot air ballooning. Further research into the characteristics of the risk participant is necessary.

4. Effect of individual skill level and perception of risk should be more thoroughly explored. For example, in a controlled situation involving a specific task in a risk activity the estimation of physical risk might be investigated in relation to the amount of skill required to complete the task and the skill level of the participant. In addition, types of injuries may be indicative of certain skill levels.

5. The relationship between risk preference in recreation and risk taking as a general characteristic should be examined through the use of standardized risk taking instruments. The self-report bias would then be eliminated.

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APPENDIX I

THE PERSONALITY RESEARCH FORM:
DEVELOPMENT, RELIABILITY, AND VALIDITY

The Personality Research Form was selected for use in this study for assessment of four personality dimensions. Following is a discussion of its development, reliability, and validity.

Development

Developed in 1967 by Jackson, the aim of the Personality Research Form (PRF) was "to provide an instrument for measuring broadly relevant personality traits in settings such as schools and colleges, clinics, guidance centers, and in business and industry" (Jackson, 1967:4). The primary focus is on normal functioning rather than upon psychopathology. Test construction was based on the theoretical structure of Murray's (1938) need system. According to Wiggin (1973:409), "The PRF is the only published multi-trait personality inventory whose development was guided explicitly by the substantive, structural, and external considerations of the construct viewpoint." These considerations took the form of 1) importance of psychological theory; 2) necessity for suppressing response style variance; 3) importance of scale homogeneity and generalizability; and 4) importance of fostering convergent and discriminant validity from the beginning of test construction (Jackson, 1967).

After the formulation of theoretically-oriented definitions of personality characteristics, a large pool of items were selected for each scale on the basis of a proposed conceptual link to the

construct being measured. These test items were administered to large samples of college students and responses were statistically treated. Biserial correlations were calculated for each item and the scale of which it was a member, related scales, and for a desirability scale. The result was a set of 20 independent scales, each with 20 items, that contributed unique information in personality assessment.

Normative scores for each of the scales were based on separate samples of over 1000 male and female college students from over 30 North American universities. The standard scores for each score had a mean of 50 and a standard deviation of 10.

Each personality dimension was conceived (both theoretically and in terms of measurement) to be bipolar. Thus, each scale consists of 10 statements written in terms of one end of the pole and 10 statements in terms of the other. Low scores as well as high scores in a particular scale denote significant personality characteristics, which serve to differentiate the subject from others.

Since Form AA (the long form of the PRF) takes 40-70 minutes for a subject to complete, four scales of interest were selected for administration to reduce the testing time per subject. These four scales were chosen from two conceptual categories as defined by the PRF manual (Jackson, 1967). Change and Harmavoidance are opposing scales in the category of measures of impulse expression and control,

and Aggression and Exhibition are opposing scales in the category of measures of degree and quality of interpersonal orientation.

Following are the definitions for each of the selected traits:

Scale	Description of High Scorer	Defining Trait Adjectives
Aggression	Enjoys combat and argument; easily annoyed; sometimes willing to hurt people to get his way; may seek to "get even" with people whom he perceives as having harmed him.	aggressive, quarrelsome, irritable, argumentative, threatening, attacking, antagonistic, pushy, hot-tempered, easily-angered, hostile, revengeful, belligerent, blunt, retaliative.
Change	Likes new and different experiences; dislikes routine and avoids it; may readily change opinions or values in different circumstances; adapts readily to changes in environment.	inconsistent, fickle, flexible, unpredictable, wavering, murable, adaptable, changeable, irregular, variable, capricious, innovative, flighty, vacillating, inconsistant.
Exhibition	Wants to be the center of attention; enjoys having an audience; engages in behavior which wins the notice of others; may enjoy being dramatic or witty.	colorful, entertaining, unusual, spellbinding, exhibitionistic, conspicuous, noticeable, expressive, ostentatious, immodest, demonstrative, flashy, dramatic, showy, pretentious.
Harmavoidance	Does not enjoy exciting activities, especially if danger is involved; avoids risk of bodily harm; seeks to minimize personal safety.	fearful, withdraws from danger, self-protecting, pain-avoidant, careful, cautious, seeks safety, timorous, apprehensive, precautionary, unadventurous, avoids risks, attentive to danger, stays out of harm's way, vigilant.

(Jackson, 1967:6-7)

Reliability

The PRF was designed with two properties of reliability in mind: first, homogeneity within a single test administration, and second, the stability of test scores over time. The construction procedures of requiring item correlations with content dimension and not with response desirability bias yielded finished scales with the properties of relatively high reliability and discriminant measurement (Jackson, 1967). The internal consistency median reliability value was .92 for the long form (AA), which according to a study by Gynther and Gynther is "remarkably high for any test and almost unbelievable for personality scales" (1976:239).

Test-retest reliability showed high stability coefficients in several studies with most correlations in the .80's. The specific correlation coefficients for the four selected scales were as follows: Aggression (.85); Change (.69); Exhibition (.88); and Harmavoidance (.90) (Jackson, 1967). High reliability allows inferences to be made regarding the relationship of scores and placement of individuals along the trait dimensions.

Validity

Both convergent and discriminant validity evaluations were made on the PRF. Convergent validity, evidence that the test correlates appropriately with other measures of the same trait, was demonstrated

in several studies. All scales (Form AA) achieved significant validity coefficients: the median correlation with behavior ratings by peers was .52 and .56 for the Trait Rating Form (Jackson, 1967).

Discriminant validity refers to the independence of dimensions such that each trait covers a distinct and nonoverlapping set of variables. Through multimethod factor analysis, discriminant and convergent validity were found for the 20 PRF scales. In almost every test the personality scales loaded the appropriate factor (Jackson, 1967). Thus it was concluded that "it is possible to treat each PRF scale as distinct, and to have confidence that each is providing a unique contribution to assessment" (Jackson, 1967:25).

APPENDIX II
QUESTIONNAIRE

VOLUNTEER FORM

Studies of man: physiological and psychological characteristics of outdoor recreation participants.

I hereby freely volunteer to act as a subject in a scientific investigation as an authorized part of the educational and research program of the University of Montana. I acknowledge that I have read and concur in the procedures and objectives of this investigation.

I certify that to the best of my knowledge and belief I have no physical or mental illness that would increase the risk to me of participation in this study.

The investigation involves an analysis of physiological and psychological characteristics of participants in different types of outdoor recreation. Psychological characteristics will be measured by questionnaire. Volunteers will be tested for pain with a pressure cuff (the type used to measure blood pressure) that will be inflated. Restoration of circulation results in almost instantaneous and complete disappearance of pain.

If you decide to volunteer, please sign this sheet indicating your willingness to comply with the provisions of the investigation and your willingness to assume personal risks of participation.

Date_____ Signature_____ Age_____

Phone_____ Address_____

Thank you for your willingness to participate in this investigation.

NAME _____

SELECTED ACTIVITIES QUESTIONNAIRE

DIRECTIONS: Complete this questionnaire by checking the answer that best describes you. Please answer as accurately as possible. All respondents' names will be kept confidential.

1. How much do you participate in the following activities?

	Number of Times per Year (CHECK ONE)		
	0	1-4	5 or more
Mountain climbing (rock, snow)			
Alpine ski jumping, racing, acrobatic or freestyle skiing			
Extended wilderness winter camping (out 2 or more nights away from trailhead without the use of motorized vehicles)			
Hang gliding			
Parachuting			
Whitewater canoeing, kayaking, rafting			

SELECTED ACTIVITIES QUESTIONNAIRE

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2. How much physical risk do you perceive to be involved in participation in the following activities? Consider high risk to be danger of death, painful or severe injury, or drowning and low risk to be small probability of injury or death.

	Amount of Perceived Physical Risk (CHECK ONE)		
	LOW	MEDIUM	HIGH
Mountain climbing (rock, snow)			
Alpine ski jumping, racing, acrobatic or freestyle skiing			
Extended wilderness winter camping (out 2 or more nights away from trailhead without the use of motorized vehicles)			
Hang gliding			
Parachuting			
WHITEWATER canoeing, kayaking, rafting			

SELECTED ACTIVITIES QUESTIONNAIRE

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3. Complete this question only if you indicated participation in any of the activities on page 1.

At what skill level do you participate in the following activities?

Skill Level of Participation
(CHECK ONE)

	BEGINNER	INTERMEDIATE	ADVANCED
Mountain climbing (rock, snow)			
Alpine ski jumping, racing, acrobatic or freestyle skiing			
Extended wilderness winter camping (out 2 or more nights away from trailhead without the use of motorized vehicles)			
Hang gliding			
Parachuting			
WHITEWATER canoeing, kayaking, rafting			

NAME _____

RECREATION INVENTORY

Please indicate the frequency of participation in the following outdoor recreation activities by checking the appropriate box. Show participation in an activity only if you do it for recreation reasons. Base the frequency of participation on the past three years and determine the average number of times in a year you participate.

	Average number of times of participation in a year (CHECK ONE)			
	0	1-5	6-10	More than 10
Bicycling				
Picnicking				
Pleasure driving				
Auto racing				
Motorcycling				
Sailing				
Canoeing, kayaking, raft				
Motorboating				
Waterskiing				
Swimming				
Scuba diving				
Day hiking, walking				
Backpacking				
Winter camping				
Car camping				
Horseback riding				
Snowshoeing				
Ski touring				
Alpine skiing				
Ice skating				
Sledding, tobogganing				
Snowmobiling				

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Average number of times of participation
in a year
(CHECK ONE)

0

1-5

6-10

More than 10

Cave exploring

Hunting

Fishing

Outdoor photography

Baseball, softball

Basketball

Football

Soccer

Volleyball

Tennis

Golf

Jogging

OTHER:

Rank the following statements in order of the way you feel. For example, if statement #4 best describes your attitude toward participation in recreation activity, place a 1 in the blank after the number 4 on the answer sheet. The number 9 will appear in the blank for the statement you least agree with.

1. I enjoy participating because it is a major contribution to my health and fitness.
2. I enjoy a feeling of freedom and release of tension while participating.
3. I enjoy the feeling that my skills are being put to the test.
4. I enjoy participation because it provides social interaction and because my friends do.
5. I enjoy the excitement, thrilling sense of danger, and strong element of daring.
6. I enjoy participating because of the beauty of scenery or grace of movement.
7. I enjoy a feeling of forcefulness and power when I participate.
8. I enjoy the hard training and intense competition that the activity provides.
9. I enjoy a sense of accomplishment when I participate.

APPENDIX III
DEVELOPMENT OF THE NINE STATEMENTS FOR RANKING
AS REASONS FOR PARTICIPATION IN RECREATION

Kenyon (1968) devised a conceptual model for characterizing physical activity as a sociopsychological phenomenon. Six domains were identified as meaningful on the basis of perceived instrumental value of physical activity for the individual. Through factor analysis and item correlation, 59 Likert-type statements were selected to represent the six domains, and this became the Attitude Toward Physical Activity test (ATPA). The six domains are as follows: 1) physical activity as a social experience; 2) physical activity for health and fitness; 3) physical activity as the pursuit of vertigo; 4) physical activity as an aesthetic experience; 5) physical activity as catharsis; and 6) physical activity as an ascetic experience.

Statements were formulated on the basis of Kenyon's (1968) description of the domains, and his labels for the domains were adopted for use in this present study. Three more statements were added: 1) recreation as a skill-testing experience; 2) recreation as a power experience; and 3) recreation as an opportunity for accomplishment. Rationales for the three additional statements are given below. These nine statements reflect sources of satisfaction that may be derived from participation in recreation. Statements which a subject ranks highest (1, 2, 3) suggest predominant reasons for his interest and participation in recreation since a person is motivated by satisfactions and pleasures gained.

Expressive travel, according to Roberts and Wicke (1971), encompasses all forms of nonutilitarian and recreational travel. Examples of boating, skiing, mountain climbing, gliding, and flying were listed. Features of expressive travel are skill and physical risk. "Self-testing" is a mode of action in which the person voluntarily tests his competence in meeting the challenges of the traveling environment. Several studies (Roberts and Wicke, 1971; Roberts et al., 1966; Roberts, et al., 1972) have found a pattern of attitudes for high self-testers which included willingness of take high physical risks, preference for maintenance of social distance, preference for games of physical skill and strategy, and high achievement motivation. Thus, a statement was formulated for use in this study, "I enjoy the feeling that my skills are being put to the test," and it was labeled "Skill-testing."

Power styles have been proposed as the basis of game preferences (Sutton-Smith, Roberts, and Kozelka, 1963), and each individual supposedly has a dominant power style. In an investigation in which incentives were compared with risk taking behavior (McClelland and Watson, 1973), those high in power motivation sought to stand out publicly by taking extreme risks. Klausner (1967) concluded from his studies on skydivers that the conquest of fear contributes to a feeling of power and that this might be a motivation for seeking stress

in sports. A statement was written to include this as a reason for participation in recreation: "I enjoy a feeling of forcefulness and power when I participate." The statement was labeled "Power."

The bulk of the experiments done in the last few decades on risk taking behavior have focused on achievement-oriented activities. According to Atkinson (1959), people high in achievement motivation will choose tasks of moderate risk because those offer the greatest subjective probability of accomplishing success. Extremely conservative or risky choices are usually taken by those with a low achievement motive because anxiety about failure is lowest in tasks of subjective probability close to 0 or 100 percent.

Although personality studies of athletes have not provided a specific athletic profile, one of the most consistent findings is that athletes or those involved in physical activity score highly in achievement scales (Vanek and Cratty, 1970). Thus, athletes have a disposition toward competing with standards of excellence where evaluation of success is immediate. However, other important motives may operate in the individual and may detract from the strength of the achievement motive. A statement was written with the above findings in mind: "I enjoy a feeling of accomplishment when I participate," and it was labeled "Accomplishment."

Following is a list of the nine statements and their labels:

1) Social. I enjoy participation because it provides social interaction and because my friends do.

- 2) Health and Fitness. I enjoy participating because it is a major contribution to my health and fitness.
- 3) Vertigo. I enjoy the excitement, thrilling sense of danger, and strong element of daring.
- 4) Aesthetic. I enjoy participating because of the beauty of scenery or grace of movement.
- 5) Freedom (Catharsis). I enjoy a feeling of freedom and release of tension while participating.
- 6) Ascetic. I enjoy the hard training and intense competition that the activity provides.
- 7) Skill-testing. I enjoy the feeling that my skills are being put to the test.
- 8) Power. I enjoy a feeling of forcefulness and power when I participate.
- 9) Accomplishment. I enjoy a sense of accomplishment when I participate.

In the pilot study, questionnaires given to each subject included the four personality scales of the PRF, Kenyon's Attitude Toward Physical Activity Test (ATPA Form D), the nine statements of reasons for participation in recreation, and ratings for perceptions of risk. Questioning after the test situation revealed that the subjects thought the testing time was too long. All the pilot subjects expressed dislike for the ATPA scale on grounds that it seemed

to be a test dealing more with the realm of sport than with recreation. Also the Likert-type response form was reported to be confusing and time consuming. All much preferred the ranking of the nine statements as a measure of why they participate in recreation. Therefore, it was decided to exclude the ATPA scale from the experiment to reduce the administrative and scoring time factor.

A correlation coefficient was computed for the relationship between a subject's score on each ATPA domain and his rank for the statement dealing with that domain. The relationship, although small, was significant at the .05 level ($r=.35$). Therefore, although a significant relationship existed between statement and the ATPA dimension, the direction of the relationship should not be predicted. It is of interest to note that the greatest variance occurred between the score for the Vertigo scale and the rank for the Vertigo statement. Although Kenyon (1968) found the highest internal consistency for the Vertigo scale, he also said that the instrumental value for Vertigo may be latent. In other words, the subject might not recognize the common element in the items as that of pursuit of vertigo. Statements by the pilot subjects verified the possibility of this occurrence. Several reported that they identified the activities in the Vertigo items not as possessing a common element of vertigo but as being very active outdoor recreation activities.

Also of interest is that the Freedom statement was most often ranked number one as the reason for recreation participation by the members of the experimental study. This statement was based on Kenyon's Catharsis domain, and his scale originally stemmed from a category entitled "Recreation Activity." Recreation activities may provide a cathartic experience not only as an outlet for aggression but also as a release from frustration in the stresses of job and everyday life.

APPENDIX IV

SUPPLEMENTARY TABLES

TABLE 33

SUMMARY OF ANOVA AMONG PARTICIPANTS, NONPARTICIPANTS "WITH INTEREST,"
AND NONPARTICIPANTS "NO INTEREST" WITH PAIN THRESHOLD
AS THE DEPENDENT VARIABLE

Source of Variation	SS	df	MS	F		\bar{X}	S.D.
Ischemic Threshold							
Participants vs. Nonparticipants "With Interest"							
Between treatments	7379.43	1	7379.43	1.88	Participants	85.94	65.23
Within treatments	286053.30	73	3918.54				
Participants vs. Nonparticipants "No Interest"					"With Interest"	64.89	56.84
Between treatments	6646.68	1	6646.68	1.91			
Within treatments	253667.98	73	3474.90				
Nonparticipants "With Interest" vs. "No Interest"					"No Interest"	65.97	43.38
Between treatments	14.38	1	14.36	.01			
Within treatments	122717.87	48	2556.62				
Pressure Threshold							
Participants vs. Nonparticipants "With Interest"					Participants	69.20	52.67
Between treatments	240.67	1	240.67	.09			
Within treatments	201917.99	73	2765.99				
Participants vs. Nonparticipants "No Interest"					"With Interest"	58.80	49.52
Between treatments	1802.66	1	1802.66	.68			
Within treatments	194781.98	73	2668.24				
Nonparticipants "With Interest" vs. "No Interest"					"No Interest"	58.80	49.52
Between treatments	2520.50	1	2520.50	.97			
Within treatments	124864.00	48	2601.33				

TABLE 34

SUMMARY OF ANOVA AMONG PARTICIPANTS IN RISK RECREATION, NONPARTICIPANTS "WITH INTEREST,"
AND NONPARTICIPANTS "NO INTEREST" WITH THE TRAIT OF AGGRESSION
AS DEFINED BY THE PERSONALITY RESEARCH FORM AS THE
DEPENDENT VARIABLE

Source of Variation	SS	df	MS	F	Group	Mean	S.D.
Participants vs. Nonparticipants "With Interest"							
Between treatments	14.11	1	14.11	1.54	Participants	5.08	3.04
Within treatments	667.68	73	9.15				
Participants vs. Nonparticipants "No Interest"							
Between treatments	.67	1	.67	.08	Nonparticipants "With Interest"	6.00	3.02
Within treatments	618.32	73	8.47				
Nonparticipants "With Interest" vs. "No Interest"							
Between treatments	15.68	1	15.68	1.47	Nonparticipants "No Interest"	5.96	3.26
Within treatments	510.64	48	10.64				

TABLE 35

SUMMARY OF ANOVA AMONG PARTICIPANTS IN RISK RECREATION, NONPARTICIPANTS
 "WITH INTEREST," AND NONPARTICIPANTS "NO INTEREST" WITH THE TRAIT
 OF EXHIBITION AS DEFINED BY THE PERSONALITY RESEARCH FORM AS
 THE DEPENDENT VARIABLE

Source of Variation	SS	df	MS	F	Group	Mean	S.D.
Participants vs. Nonparticipants "With Interest"							
Between treatments	30.83	1	30.83	2.22	Participants	9.68	3.75
Within treatments	1011.84	73	13.86				
Participants vs. Nonparticipants "No Interest"							
Between treatments	2.16	1	2.16	.13	Nonparticipants "With Interest"	11.04	3.72
Within treatments	1211.84	73	16.60				
Nonparticipants "With Interest" vs. "No Interest"							
Between treatments	12.50	1	12.50	.67	Nonparticipants "No Interest"	10.04	4.32
Within treatments	901.92	48	18.79				

TABLE 36

MEANS, STANDARD DEVIATIONS, AND F-RATIOS FOR THE PARTICIPANTS IN THE FIVE
SELECTED OUTDOOR RECREATION ACTIVITIES WITH PAIN TOLERANCE AS THE
DEPENDENT VARIABLE

Pain Test	Mountain Climbers		Ski Jumpers et al		Pilots Hang Glider		Skydivers		Whitewater Boaters		F
	M	S.D.	M	S.D.	M	S.D.	M	S.D.	M	S.D.	
Ischemia	177.24	78.05	182.59	79.37	156.65	74.83	185.41	73.39	185.18	61.24	.26
Gross Pressure	216.50	63.86	168.33	93.21	272.00	94.02	179.00	94.80	255.60	68.84	.15

TABLE 37

RAKES, MEAN RANKS, STANDARD DEVIATIONS, AND F-RATIOS OF
PARTICIPANTS IN THE FIVE SELECTED OUTDOOR RECREATION
ACTIVITIES WITH REASONS FOR PARTICIPATION IN
RECREATION AS THE DEPENDENT VARIABLE

Statement of Reason	Mountain Climbers			Ski Jumpers, Racers, Acrobatic			Hang Glider Pilots			Skydivers			Whitewater Boaters			F
	Rank	Mean	S.D.	Rank	Mean	S.D.	Rank	Mean	S.D.	Rank	Mean	S.D.	Rank	Mean	S.D.	
Health and Fitness	6	4.4	1.43	5	4.8	2.22	5	4.5	2.51	6	5.0	2.30	2.5	3.13	2.10	.98
Freedom	3	3.6	2.01	2	3.8	2.21	1	3.0	1.41	1	2.6	3.29	1	2.25	.89	.10
Skill-testing	2	3.5	1.58	1	3.3	2.19	3	4.3	2.70	3	3.8	1.67	5	5.10	1.95	1.10
Social	7	6.8	1.55	8	6.5	2.39	8	6.2	2.39	4	4.5	1.34	6	5.30	2.32	2.14
Vertigo	5	4.3	2.83	4	4.5	2.58	6	5.4	2.12	7	6.6	2.22	8.5	7.25	1.79	3.89*
Aesthetic	1	3.1	2.28	3	4.0	2.63	2	3.7	2.63	2	3.3	1.77	4	4.75	1.67	.72
Power	8	7.7	1.26	7	5.9	2.31	7	6.0	2.79	9	7.6	1.79	8.5	7.25	2.37	1.70
Ascetic	9	7.8	1.87	9	6.7	2.27	9	7.0	3.21	8	6.8	2.39	7	6.9	1.80	.32
Accomplishment	4	3.8	2.39	6	5.5	2.92	4	4.4	2.37	5	4.8	2.35	2.5	3.13	1.82	1.40

* $p < .05$

TABLE 38

SUMMARY OF ANOVA AMONG THE PARTICIPANTS IN THE FIVE SELECTED
OUTDOOR RECREATION ACTIVITIES WITH PERCEPTION OF RISK
AS A GENERAL CHARACTERISTIC AS THE DEPENDENT VARIABLE

Source of Variation	SS	df	MS	F
Among treatments	1.38	1	.35	1.72
Within treatments	9.12	45	.20	

TABLE 39

SUMMARY OF ANOVA BETWEEN THE SELF-RATED HIGH AND LOW RISK GROUPS WITH
RESPONSE TO PAIN AS THE DEPENDENT VARIABLE

Source of Variation	SS	df	MS	F	Self-rated High Risk Group		Self-rated Low Risk Group	
					Mean	S.D.	Mean	S.D.
Pain Threshold								
Ischemia								
Between treatments	4.48	1	4.48	.00	75.51	59.05	76.37	58.75
Within treatments	341741.88	98	3487.16					
Pressure								
Between treatments	1346.10	1	1346.10	.50	64.49	51.73	79.41	51.60
Within treatments	262228.65	98	2675.80					
Pain Tolerance								
Ischemia								
Between treatments	10438.50	1	10438.50	1.96	169.57	73.02	128.03	73.38
Within treatments	522589.72	98	5332.55					
Pressure								
Between treatments	6130.72	1	6130.72	.70	207.62	93.44	175.78	93.30
Within treatments	855698.20	98	8731.62					

TABLE 40

RANKED ORDER OF REASONS FOR PARTICIPATION IN RECREATION
BY THE SUBJECTS IN THE EXPERIMENTAL GROUPS

Statement of Reason	Participants	Mountain Climbers	Ski Jumpers et al	Hang Glider Pilots	Skydivers	Whitewater Boaters	Nonparticipants	Nonparticipants "With Interest"	Nonparticipants "No Interest"	Self-Rated High Risk	Self-Rated Low Risk
Health and Fitness	4	6	5	5	6	3	4	2.5	5	2	6
Freedom	1	3	2	1	1	1	1	1	2	1	1
Skill-testing	3	2	1	3	3	5	3	2.5	3	3	3
Social ^{a,c}	7	7	8	8	4	6	2	5	1	6	4
Vertigo ^{a,b,c,e}	6	5	4	6	7	8.5	9	9	9	7	9
Aesthetic ^{a,b,c}	2	1	3	2	2	4	6	7	6	4	5
Power ^{a,b}	8	8	7	7	9	8.5	7	6	7	8	8
Ascetic ^{a,b}	9	9	9	9	8	7	8	8	8	9	7
Accomplishment ^f	5	4	6	4	5	2	5	4	4	5	2

Significant difference in ranking ($p \leq .05$) in the following comparisons:

^a Participants vs. Nonparticipants

^b Participants vs. Nonparticipants "With Interest"

^c Participants vs. Nonparticipants "No Interest"

^d Nonparticipants "With Interest" vs. Nonparticipants "No Interest"

^e Among the Participants in the selected recreation activities

^f Self-rated High Risk vs. Self-rated Low Risk