

## INFORMATION TO USERS

**This was produced from a copy of a document sent to us for microfilming. While the most advanced technological means to photograph and reproduce this document have been used, the quality is heavily dependent upon the quality of the material submitted.**

**The following explanation of techniques is provided to help you understand markings or notations which may appear on this reproduction.**

- 1. The sign or "target" for pages apparently lacking from the document photographed is "Missing Page(s)". If it was possible to obtain the missing page(s) or section, they are spliced into the film along with adjacent pages. This may have necessitated cutting through an image and duplicating adjacent pages to assure you of complete continuity.**
- 2. When an image on the film is obliterated with a round black mark it is an indication that the film inspector noticed either blurred copy because of movement during exposure, or duplicate copy. Unless we meant to delete copyrighted materials that should not have been filmed, you will find a good image of the page in the adjacent frame.**
- 3. When a map, drawing or chart, etc., is part of the material being photographed the photographer has followed a definite method in "sectioning" the material. It is customary to begin filming at the upper left hand corner of a large sheet and to continue from left to right in equal sections with small overlaps. If necessary, sectioning is continued again—beginning below the first row and continuing on until complete.**
- 4. For any illustrations that cannot be reproduced satisfactorily by xerography, photographic prints can be purchased at additional cost and tipped into your xerographic copy. Requests can be made to our Dissertations Customer Services Department.**
- 5. Some pages in any document may have indistinct print. In all cases we have filmed the best available copy.**

**University  
Microfilms  
International**

300 N. ZEEB ROAD, ANN ARBOR, MI 48106  
18 BEDFORD ROW, LONDON WC1R 4EJ, ENGLAND

8107966

ROSE, KENNETH GENE

A STUDY OF PSYCHOLOGICAL AND PHYSICAL TRAITS AND  
PREDICTION OF PERFORMANCE OF PARTICIPANTS IN HIGH RISK  
ACTIVITIES - A MODEL FOR PROGRAM DEVELOPMENT

*The University of Oklahoma*

Ed.D.

1980

University  
Microfilms  
International 300 N. Zeeb Road, Ann Arbor, MI 48106

THE UNIVERSITY OF OKLAHOMA  
GRADUATE COLLEGE


A STUDY OF PSYCHOLOGICAL AND PHYSICAL TRAITS AND  
PREDICTION OF PERFORMANCE OF PARTICIPANTS IN  
HIGH RISK ACTIVITIES - A MODEL  
FOR PROGRAM DEVELOPMENT

A DISSERTATION  
SUBMITTED TO THE GRADUATE FACULTY  
in partial fulfillment of the requirements for the  
degree of  
DOCTOR OF EDUCATION

BY  
KENNETH GENE ROSE  
Norman, Oklahoma  
1980

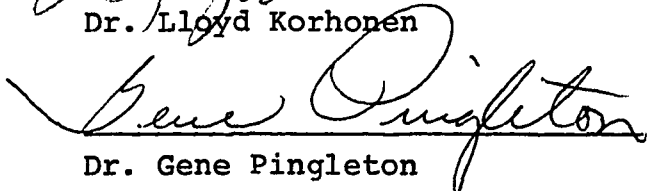
A STUDY OF PSYCHOLOGICAL AND PHYSICAL TRAITS AND  
PREDICTION OF PERFORMANCE OF PARTICIPANTS IN  
HIGH RISK ACTIVITIES - A MODEL  
FOR PROGRAM DEVELOPMENT

APPROVED BY

  
Dr. Jack Parker, Chairman

  
Dr. Virginia Gillespie

  
Dr. Lloyd Korhonen

  
Dr. Gene Pingleton

DISSERTATION COMMITTEE

## ACKNOWLEDGMENTS

I wish to express my sincere gratitude to Dr. Jack Parker, chairman of the doctoral committee for his help and advice throughout the doctoral program and dissertation. An expression of deepest appreciation is also given to Dr. Virginia Gillespie for her encouragement and assistance in the development of the program and study. Thanks is also expressed to other members of the doctoral committee, Dr. Lloyd Korhonen, and Dr. Gene Pingleton for their support, interest, and suggestions in the development of the study.

Special thanks is also expressed to Dr. Steve Heyman for his statistical and evaluative help. Recognition and thanks is also given to Dr. L.J. Van Horn, and Dr. Charles Hundley, Department Chairmen of Health, Physical Education, and Recreation at Southwestern Oklahoma State University, for their patience and encouragement during the study and for making it possible.

To my wife Terry, and other members of my family David, D'Ann, Pauline, Jewell, and Judy a very special thanks is expressed for their help and support. Recognition is also given to SCUBA instructors Chris Pollman, and Stan Johnson for their valuable assistance.

## TABLE OF CONTENTS

	Page
ACKNOWLEDGMENTS . . . . .	iii
LIST OF TABLES . . . . .	vi
 Chapter	
I. THE PROBLEM . . . . .	1
Introduction . . . . .	1
Background and Need . . . . .	2
Statement of the Problem . . . . .	7
Hypothesis to be Tested . . . . .	8
Procedure . . . . .	9
Statement of Purpose . . . . .	10
Operational Definitions . . . . .	10
Limitations . . . . .	11
Organization of the Report . . . . .	11
II. REVIEW OF THE LITERATURE . . . . .	13
Introduction . . . . .	13
Background Literature . . . . .	13
SCUBA Diving Research . . . . .	18
Psychological Traits of Divers . . . . .	21
Prediction of Performance in Divers . . . . .	27
Summary . . . . .	29
III. METHODOLOGY . . . . .	31
Population and Sample . . . . .	31
Instrumentation . . . . .	32
Research Design . . . . .	47
Choice of Statistics . . . . .	49
Summary of Methods and Procedure . . . . .	50
IV. ANALYSIS AND INTERPRETATION OF DATA . . . . .	52
Results of Hypothesis Testing . . . . .	53
Additional Supportive Data . . . . .	63
Study 1 . . . . .	64
Study 2 . . . . .	78
Out-Dive Underwater Evaluation . . . . .	92
Comparison of Data for Three Semesters . . . . .	98

# TABLE OF CONTENTS--Continued

Chapter	Page
V. SUMMARY, FINDINGS, CONCLUSIONS AND INFERENCES . . . . .	105
Summary . . . . .	105
Findings . . . . .	106
Conclusions . . . . .	107
Inferences . . . . .	108
BIBLIOGRAPHY . . . . .	111
APPENDICES . . . . .	117
APPENDIX A: ATTITUDE TOWARD PHYSICAL ACTIVITIY . .	118
APPENDIX B: BEM SEX ROLE INVENTORY . . . . .	123
APPENDIX C: THE ROTTER INTERNAL-EXTERNAL CONTROL SCALE . . . . .	125
APPENDIX D: THE SENSATION SEEKING SCALE . . . . .	128
APPENDIX E: SPIELBERGER STATE-TRAIT ANXIETY SCALE.	132
APPENDIX F: OUT-DIVE EVALUATION . . . . .	134
APPENDIX G: POOL EVALUATION . . . . .	140
APPENDIX H: RYMAN AND BIERSENER TRAINING SCALE . .	141
APPENDIX I: SPORTS REACTION PROFILE . . . . .	143

## LIST OF TABLES

Table	Page
1. Means and Standard Deviations for Sensation-Seeking, Attitude Toward Physical Activity, and the Bem Sex Role Inventory for Males and Females . . . . .	47
2. Summary of Comparisons of Male-Female Differences (Study 1) . . . . .	57
3. Summary of Male-Female Comparisons (Study 2) . .	59
4. Summary of Pearson's $r$ for Birth Order for Second Semester . . . . .	61
5. Summary of Correlations of Data with Birth Order (1st Study) . . . . .	62
6. Correlation of Pool Ratings with Sociometrics and Personality Data . . . . .	65
7. Summary of Correlations of Out-Dive Behavior with Sociometric and Personality Data (First Semester) . . . . .	67
8. Correlation of Pool Skills with Out-Dive Behavior (1st Study) . . . . .	74
9. $T$ -Tests Comparing State Anxiety Scores of Students making only one dive with those making two or more (Study 1) . . . . .	76
10. Intercorrelations of Pool Ratings (2nd Study) . .	80
11. Summary of Correlations between Pool Ratings and Personality Scales (2nd Study) . . . . .	81
12. Summary of Intercorrelations between Pool and Strength Fitness Measures (2nd Study) . . . . .	82
13. Summary of Significant Correlations between Pool Ratings and Open Water Dive Behaviors (2nd Study) . . . . .	83

Table	Page
14. Summary of Intercorrelations of Personality and Out-Dive Data (2nd Study) . . . . .	85
15. Summaries of Comparisons of Certified and Non-Certified Male Students (Study 2) . . . . .	91
16. Summary of Intercorrelations of Breath and Pulse Measures with Open-Water Dive Behaviors (2nd Study) . . . . .	93
17. Summary of Items and Factor Loading for Open-Water Ratings . . . . .	95
18. Summary of Correlations between Fitness Measures and Underwater Ratings . . . . .	98
19. Summary of Correlations between Underwater Ratings and Personality Scales . . . . .	99
20. Summary of Significant Mean Comparisons for Three Semesters . . . . .	102

A STUDY OF PSYCHOLOGICAL AND PHYSICAL TRAITS AND  
PREDICTION OF PERFORMANCE OF PARTICIPANTS IN  
HIGH RISK ACTIVITIES - A MODEL  
FOR PROGRAM DEVELOPMENT

CHAPTER I

THE PROBLEM

Introduction

The ability to identify psychological traits and to predict performance from these traits based upon written tests given at the beginning of a SCUBA course, and prescribed observations made during early swimming pool exposure involving specified skill tests, would be a great asset to administrators of physical education and recreation programs, instructors of SCUBA, and students involved in beginning SCUBA programs. Identification of these aspects and components would enable the administrator to better schedule time, and classes. It would also allow the SCUBA instructor to give additional assistance to students with potential for later problems. The student would obviously benefit from resulting changes in class scheduling by the administrator, and additional help by the instructor. Administrators are

reluctant to include risk oriented activity would have a tool by which they could identify positive and negative behavioral aspects, potential for liability, and the worth of such courses dealing with high risk. The carry over value of these abilities into all areas of high risk activity is readily apparent.

### Background and Need

The matriculant in SCUBA as well as the administrator and the instructor could well benefit by knowledge of factors affecting successful completion of the course. The reason and necessity for research becomes obvious with the identification of reasons for teaching SCUBA and other risk activities as sports in the various university classes. SCUBA and other risk-oriented sports are offered as courses in the university setting because of interest on the part of the institution, verified by the many hazards associated with risk sports. Recent research in behavioral needs and level of participation in risk activities indicates and clearly supports the need for stimulation at various levels of risk involvement depending on the individual.<sup>1</sup>

Very little research has been done on the psychological aspects of risk activities although for example the

---

<sup>1</sup>J.F. Meier, "Is the Risk Worth Taking?" Leisure Today an editorial insert in the Journal of Physical Education and Recreation of the American Alliance for Health, Physical Education, and Recreation 26 (April 1978): 7-9.

sport of SCUBA diving and military diving are known to be characteristically hazardous. As a result of the lack of research done on divers little is known about the interactions involving the psychiatric and emotional realms of behavior. This knowledge could be an advantage considering the real facts which indicate that two Navy divers are killed and another fifty are seriously injured every year during the past decade in diving accidents.<sup>1</sup> This statistic stands out in a Navy diving population of only five thousand.

A pragmatic approach to use of psychological evaluation of SCUBA divers by administrators comes from the Federal School for Commercial and Sport Divers in Italy. Their studies characterized the diver as being highly independent, persistent, aware of reality, having inner security and satisfactory adjustment to environmental situations. As data is collected it is put into use in both teaching and counseling in regard to each diver.<sup>2</sup>

At this point it would be well to take into account the need for different levels of sensation seeking. Different people driven by internal forces seek varying levels of stimuli depending on their own unique psychological makeup.

---

<sup>1</sup>T.E. Berthage, "Summary statistics: US Navy diving accidents," US Navy Ex. Div. Unit Res. Rpt. 1-66, 1966; and R.E. Doll, and T.E. Berthage, "Interrelationships of Several Parameters of Decompression Sickness." US Navy Ex. Div. Unit Res. Rpt. 7-65, 1967.

<sup>2</sup>S. Caneva and G.C. Zuin, "Psychological Evaluation of SCUBA Divers," The Research Quarterly 47 (1968): 175-179, 247-253.

Much psychological research has been done identifying the order and priority of needs, and the fulfillment of these needs resulting in activating higher-order desires.

Zuckerman suggests the generality of sensation seeking ranging from visual to other sensory modalities. An interesting result of his study is that identified high sensation seekers tend to rate many danger-prone activities as pleasurable, rather than displaying the expected response of anxiety.<sup>1</sup> If these tests did in fact identify such students, two possibilities are suggested: SCUBA divers will be higher in sensation seeking than the general population; success in students will relate to their levels of sensation seeking and if they did excel in diving, we would have some measurable basis for screening possible problems in the instructional process as well as a format for selection of individuals with positive attributes for SCUBA diving.

There is a tendency by many administrators of recreation programs both on the college level and the public school level to take a negative attitude toward risk sports because of their elements of danger.<sup>2</sup> This may in part be due to our value system and current trend for courts to

---

<sup>1</sup>Marvin Zuckerman, "The Search for High Sensation," Psychology Today, February 1978, 38-40, 46, 96, 98.

<sup>2</sup>R.M. Schreyer, B. White, and S.F. McCool, "Common Attributes Uncommonly Exercised." Leisure Today, (an editorial insert) Journal of Physical Education and Recreation of the American Alliance for Health, Physical Education, and Recreation (April 1978): 36-38.

assign liability to administrators who let people perish at their own hands. However, if behavioral needs are met and there is demand for risk sports then there is a case to be made for the providing of these opportunities to people and their subsequent education for the safest possible exposure to that sport. As stated by Schreyer, White, and McCool:

It is a challenge for both scientists and the providers of risk sport opportunities not only to recognize the complexity of their experience, but to actively ensure that appropriate places and programs for such activities are furnished. Given the rising cultural significance of risk sports, ignoring these responsibilities would be professionally negligent.<sup>1</sup>

and as stated by White:

A more detailed understanding of the nature of natural challenge activities on the part of practitioners, educators, and administrators might result in more favorable responses to program proposals for high-stress outdoor activities. Perhaps more energy will be devoted to the study of stress-seeking activities by leisure researchers<sup>2</sup> as demand for such activities continues to increase.

Research of this type could determine the effects of personality on performance in risk activities, as well as personality factors involved in the selective participation in this type of sport. In addition, such research could be utilized by administrators and instructors to develop specialized programs and training techniques for students who

---

<sup>1</sup>Ibid., p. 36-38.

<sup>2</sup>R.W. White, "Motivation Reconsidered," Psychological Review 66, 1959, pp. 313-324.

might take such training, but who have a greater potential for failure or injury based on psychological factors.

Another factor is that the inclusion of high adventure leisure classes such as SCUBA in public sponsored organizational programs may produce a negative reaction in the administrator because of reported drownings and purported regulatory legislation from avenues such as the Los Angeles County Board of Supervisors. The negative reaction may result from a general misunderstanding of the purposes and values of adventure and risk programs as well as from an overriding fear of legal liability implications.<sup>1</sup>

With the recognition by administrators that in SCUBA programs the dropout rate of divers after only one year of certification reaches 80 percent,<sup>2</sup> due apparently to inadequate training and lack of confidence, comes the realization that identification of these potential dropouts early in training could facilitate additional training. It would also help to facilitate an increased number of continuing divers.

Additional administrative concerns are evident when organizations are faced with drownings occurring in the diving

---

<sup>1</sup>J.F. Meier, "Is the Risk Worth Taking?" Leisure Today (an editorial insert) Journal of Physical Education and Recreation of the American Alliance for Health, Physical Education, and Recreation (April 1978): 7-9.

<sup>2</sup>J.F. Strykowski, "Keynote Address," presented at the 1976 Southwest Area YMCA SCUBA Instructors' Convention, Dallas, Texas, November 11, 1976.

community resulting from inability on the diver's part to cope with the underwater environment as well as accidents occurring in other risk activities. These concerns are also voiced by legislative bodies in the form of controlling laws and regulations designed to keep people out of SCUBA and other risk sports rather than solving the problem. Over-reactive blind legislation brought about by emotion rather than by sound reasoning limiting already limited opportunities to exercise personal freedom will not solve the problem. Proper training enhanced by guidelines developed through psychological testing should prove to be very helpful to the diving community as well as other risk activity areas insuring an instructional product which is safe, well-trained, and having the ability to cope with the underwater environment.

#### Statement of Problem

This research effort was designed to identify psychological traits and to predict performance from these traits based upon written test. It will also attempt to point out behavioral needs fulfilled by the administrative inclusion of risk oriented activities. Some specific questions to which the study was directed were:

1. What psychological traits exist in high risk activity participants which may be predictive of success?
2. Of what importance is birth order regarding risk sports?
3. Is there a reason for the differences in performance between males and females?

4. Does early performance indicate later success in risk activities?
5. Should administrators of public agencies such as schools, colleges, and universities sponsor risk oriented recreation like SCUBA and others?
6. Is administration of risk recreation too costly considering liability, safety implications, and the hiring of qualified individuals for instruction?

### Hypotheses to be Tested

In order to answer questions presented in the Statement of Problem, the following null hypotheses would be tested.

#### Ho<sub>1</sub> Anxiety

There is no significant difference between participants in risk oriented courses and normative population samples in measures of anxiety.

#### Ho<sub>2</sub> Sensation Seeking

There is no significant difference between high risk activity participants and the general population with regard to sensation seeking.

#### Ho<sub>3</sub> Locus of Control

There is no significant difference between high risk activity participants and the general population in the locus of control.

#### Ho<sub>4</sub> Sex and Sex Role

There is no significant difference between male and female participants in high risk activities in regard to personality traits or performance.

#### Ho<sub>5</sub> Birth Order

There is no significant difference between birth order groups in performance or success in high risk sports.

### Procedure

The test sample included fifty-two students enrolled either full-time or part-time at Southwestern Oklahoma State University and subsequently enrolled in Basic SCUBA. There were forty males and twelve females taking part in the study.

The Basic SCUBA class consisted of a total forty-four hour instruction. It was broken down into eighteen hours pool work, eighteen hours classroom preparation, and the remainder open water work. Because of the very nature of the course and study the sample cannot be considered a random sample. Each student selected himself or herself into the class and of necessity received the same training.

Each student in the class was given a battery of psychological tests which were of an established nature. Each test was devised and constructed by noted men in the field of psychology. In addition to the psychological test each student participated in skill and physical fitness evaluations conducted by the SCUBA instructors.

Because of the uniqueness of the study, the research design did not fit the classical experimental model. The data was collected as a by-product of an ongoing activity. The students participated as subjects only when they filled out questionnaires.

Statistical applications were made on all generated data using t test, f tests, and when examining three or more groups a one-way analysis of variance (ANOVA) was used. A

Pearson's r was used to determine the existence of a linear correlation between variables.

#### Statement of Purpose

The purpose of this study was to determine the possibility of identifying specific personality and physical characteristics present in high risk activity participants by use of written test. In addition, prediction of performance was sought based on those tests in addition to basic skill tests given early in the course. If the possibility for identification and subsequent prediction exists, such information will be used to determine direction of counseling and determination of additional training aspects.

#### Operational Definitions

1. Diver - Individual using self-contained underwater apparatus to go beneath the surface of the water.
2. SCUBA Certification Class - Class of instruction resulting in individual's completion of minimum requirements of the YMCA SCUBA Standards for the SCUBA Diver indicating verification of competence and knowledge, YMCA SCUBA Leadership Manual (1979).
3. Logged Dive - A dive which involves a minimum of either fifteen minutes actual bottom time using compressed air or the use of 35 cubic feet of air, YMCA SCUBA Leadership Manual (1979).
4. Open Water - An area which is not confined and publicly suppressed, i.e., lakes, quarries, rivers, springs, and the open sea. All areas other than swimming pools, YMCA SCUBA Leadership Manual (1979).
5. Check-Out Dive - Logged dive with an instructor.

6. Monitored Free Dive - The second check-out dive made with an Assistant YMCA SCUBA Instructor.
7. Bailout - This exercise consists of the basic SCUBA student jumping into the deep end of a swimming pool with mask, fins, snorkel, and SCUBA equipment in hand but not on. The student then dons all equipment underwater.

### Limitations

Limitations existed in the present study as in any research endeavor. Limitations of importance were as follows:

1. The sample was limited to college students enrolling in Basic SCUBA and attending Southwestern Oklahoma State University during two different semesters.
2. Generalizations in many cases were difficult because of the uniqueness of the study and the sample.

### Organization of the Report

The research paper will be composed of five chapters. Chapter I will be the problem which will include an introduction, background and need, a statement of the problem, hypotheses to be tested, procedure, statement of purpose, operational definitions, limitations, and organization of the report. Chapter II will be a review of the literature which will include an introduction, background literature, SCUBA diving research, psychological traits of divers, prediction of performance in divers as well as other high risk endeavors, and the summary. Chapter III deals with methodology including population and sample, instrumentation, research design, choice of statistics, and summary of methods

and procedures. Chapter IV is an analysis and interpretation of data which includes results of hypothesis testing, test results and evaluations, additional supportive data, and a comparison of data for three semesters. Chapter V is the summary, findings, conclusions, and recommendations.

## CHAPTER II

### REVIEW OF THE LITERATURE

#### Introduction

The intent of this chapter is to present a brief review of literature dealing with administrative concerns and background regarding risk recreation as well as literature dealing with identifiable psychological and physical traits of participants in high risk activities. The chapter will also include literature related to prediction of performance of high risk participants.

Specifically, the review will detail available information concerning the above mentioned areas.

#### Background Literature

There is an increasing interest in risk recreation or high adventure leisure pursuits. The interest is apparently due to the inherent excitement associated with activities involving adventure. Professionals in the field of education and recreation are finding that more and more people are spending their leisure time involved in activities such as SCUBA diving, sky diving, white water kayaking, mountaineering, and other endeavors of such nature.

Maslow described such experiences as "peak experiences".<sup>1</sup> The reason for risk recreation as a choice might best be described by Rousseau when he said "Man is born free, and everywhere he is in chains."<sup>2</sup> With the advancement of man's technology in various areas we have experienced an increase in popularity and participation in risk activities. This may in part be due to an increase in instructional programs, and safety procedures.

The use of adventure programming to achieve positive change in the individuals they serve is another reason for popularity of programs involving risk. One such program of adventure training is Outward Bound. Outward Bound has instigated a rapid growth in risk programming in more than 100 secondary schools across the country.<sup>3</sup> Institutions such as the Massachusetts Youth Service have indicated that outdoor survival programs have provided youthful offenders in the states of Colorado, Minnesota, and Hurricane Island, Maine, with a sense of selfworth and self-confidence which

---

<sup>1</sup>A. Maslow, Toward a Psychology of Being, 2nd ed. (Princeton, New Jersey: D. Van Nostrand Company, Inc., 1968), pp. 103-14.

<sup>2</sup>J.J. Rousseau, A Discourse on the Origin of Inequality, trans. G.D.H. Cole, Great Books of the Western World, Vol. 38. (Chicago: Encyclopedia Britannica, 1952), p. 352.

<sup>3</sup>H.L. Dickey, "Outdoor Adventure Training," Leisure Today (April 1978): pp. 11-14: (An editorial insert in the Journal of Physical Education and Recreation April 1978, p. 35).

enabled the participants to redirect their lives and stay out of trouble.<sup>1</sup>

In 1971, Project Adventure (an Elementary Secondary Education Act Title III program) began at Hamilton-Wenham Regional High School, Hamilton, Massachusetts. This innovative program combined adventure, training, cooperation with classmates, exposure to direct experiences, and the bringing together of all aspects of the student's being to make up their personality. It has received several national awards. The project has been designated a demonstration site within the national diffusion network through the United States Office of Education.<sup>2</sup> As stated by Webster:

The project believes that a key ingredient to physical education is providing a dynamic experience which, when offered in an atmosphere of fun, promotes a willingness to try.<sup>3</sup>

Across the United States we find more and more people developing their lives around a recreational pursuit or group of recreational pursuits. This is not surprising when we consider that Americans spend \$200 billion a year on leisure activities.<sup>4</sup>

---

<sup>1</sup>S.D.H. Yenser, "Personal and Interpersonal Effects of Outdoor Survival," (Master's thesis, Brigham Young University, 1971, p. 9).

<sup>2</sup>S.E. Webster, "Project Adventure a Trip into the Unknown," Leisure Today (April 1978): pp. 15-17: (An editorial insert in the Journal of Physical Education and Recreation, April 1978, p. 39-41).

<sup>3</sup>Ibid.

<sup>4</sup>R.G. Kraus and J.E. Curtis, Creative Administration in Recreation and Parks (St. Louis: C.V. Mosby Company, 1977), p. 1.

With the search for meaningful leisure lifestyles, and the worthy use of leisure time, it seems likely that the demand for stress-seeking recreation will increase.<sup>1</sup> There are several indicators of an increased emphasis in adventure activities in our population. As an example, there are at present many adventure programs in evidence at colleges and universities across the United States. These programs are housed in the departments of health, physical education, and recreation as well as leisure services, and park administration departments. Most sponsoring agencies having risk programs realize that the prime component of risk education is the involvement of qualified leaders. As stated by Meier:

Agencies may also be reluctant to offer such programs because of the scarcity of professional recreation personnel who are qualified to organize and lead risk activities. The ever increasing number of individuals pursuing risk recreation today has produced demands for trained individuals equipped with the essential skills to serve as leaders of high risk programs.<sup>2</sup>

To further qualify the fact that risk recreation is becoming increasingly popular, we find that special population groups are demanding the right to engage in risk

---

<sup>1</sup>R.W. White, "Motivation Reconsidered: The Concept of Competence," Psychological Review 66 (1959): 313-24.

<sup>2</sup>J.F. Meier, "Is the Risk Worth Taking?" Leisure Today (April 1978): pp. 7-9: (An editorial insert in the Journal of Physical Education and Recreation April 1978, pp. 31-33.

recreation.<sup>1</sup> Many handicapped people are taking up risk recreation pursuits such as SCUBA, snow skiing, snow mobiling, and many others.

With the advent and acceptance of risk recreation on the American scene comes the realization of the potential danger associated with it. The potential danger can be lessened to a great extent by proper training and education. As an example the reason the American Red Cross began teaching swimming lessons and their being offered as part of a public school's curriculum in many schools and summer recreation programs was an increase of drownings across the United States to an intolerable level. The justification for teaching risk and adventure classes is education for safety. Education provides a vehicle by which the average person can undertake a risk activity armed with proper tools both mental and physical to cope with the physical and spiritual challenge experienced in risk leisure.

In risk recreation the participant may be hurt or even killed depending on his or her level of involvement and participation.<sup>2</sup> Therefore, the administrator must be careful to provide the best possible education for risk recreation. Miles stated that:

---

<sup>1</sup>C.A. Peterson, "The Right to Risk," (April 1978): pp. 23-24: (An editorial insert in the Journal of Physical Education and Recreation April 1978, pp. 47-48.

<sup>2</sup>J.C. Miles, "The Value of High Adventure Activities," Leisure Today (April 1978): pp. 3-4: (An editorial insert in the Journal of Physical Education and Recreation April 1978, pp. 31-33.

Maslow believed that all people have a need for growth, and perhaps risk recreation is one way in which this need is met in the United States where most of the more basic physiological and security needs are satisfied for many people.<sup>1</sup>

### SCUBA Diving Research

SCUBA diving is a widely taught sport, with an estimated one to two million divers in the United States.<sup>2</sup> Although it is considered a high-risk sport, except for a few articles on military demolition divers,<sup>3</sup> and two unrelated articles on SCUBA students,<sup>4</sup> no systematic research has been done in the area.

In SCUBA the available research is limited because of the newness of the sport. The "aqualung" was developed in 1943. In part, it grew out of the need for its capabilities by the military. As a result, most of the research that has been conducted has been related to the military.

Little research has been done on the characteristic traits of SCUBA divers although the sport of SCUBA diving

---

<sup>1</sup>Maslow, Toward a Psychology of Being, 2nd: pp. 103-14.

<sup>2</sup>Society of Actuaries. Transaction-1976 Reports, 1977, pp. 93-103.

<sup>3</sup>R.J. Biersner and D.H. Ryman, "Prediction of SCUBA Training Performance," Journal of Applied Psychology 59 (1974): pp. 519-521; D.H. Ryman and R.J. Biersner, "Attitudes Predictive of Diving Training Success," Personnel Psychology 28 (1975) pp. 181-188.

<sup>4</sup>S. Caneva and G.C. Zuin, "Psychological Evaluation of SCUBA Divers," The Research Quarterly 47 (1968): 175-9, 247-53; G. Weltman and G.H. Egstrom, "Personal Autonomy of SCUBA Diver Trainees," Research Quarterly 40 (1969): 613-8.

and military diving is participated in by many people and is known to be hazardous. As a result of the lack of research done on divers little is known about interactions among the psychiatric, emotional, and physical attributes of participants. This knowledge could be an advantage considering the real facts as given by the work of Berghage, and Doll and Berghage which indicates that two Navy divers are killed and another fifty are seriously injured every year during the past decade in diving accidents. This statistic stands out in a Navy diving population of only five thousand.<sup>1</sup>

Biersner and Ryman found that although divers as a group tended to experience some evidence of psychiatric problems higher than normal, these individuals could be identified by lower than normal intelligence, mechanical, and arithmetic aptitudes, as well as taking longer to advance in light of promotions.<sup>2</sup>

Following the increase of risk recreation participants is the growing number of agencies involved in representation and regulation of these interest. One such group is the Council for National Cooperation in Aquatics (CNCA).

---

<sup>1</sup>U.S. Navy Ex. Div. Unit Res. Rpt., T.E. Berthage, "Summary Statistics: U.S. Navy Diving Accidents," 1-66, 1966; U.S. Navy Ex. Div. Unit Res. Rpt., R.E. Doll and T.E. Berthage, "Interrelationships of Several Parameters of Decompression Sickness," 7-65, 1967.

<sup>2</sup>R.J. Biersner and D.H. Ryman, "Psychiatric Incidence Among Military Divers," Military Medicine 139 (1974): 633-5.

In November 1974 in Phoenix, Arizona, CNCA held their 18th National Aquatic Conference. During this conference SCUBA interest groups expressed concern over proposed legislation developed in Los Angeles. The intent of the legislation was to increase regulations and restrictions in the sport of SCUBA. The intent of the L.A. County Board of Supervisors was to decrease the number of drownings which had occurred during the preceding two or three years by increasing regulations in the sport of diving.<sup>1</sup>

During the 1974 meeting the CNCA maintained that:

Divers have accidents because they do not follow safe diving practices; do not use good judgment, particularly in emergencies; do not develop or maintain the necessary skills and mental/physical condition required for diving.<sup>2</sup>

There are several facts that draw the attention of administrators of risk programs like SCUBA as identified by the 1974 CNCA conference. With regard to possible problems several key areas of concern and interest were voiced. Included were equipment, retail merchants, divers themselves, and training. Divers and the training they receive are two variables over which the administrator has some degree of control over. Several problems were identified. They were:

That underwater instructors do not adequately prepare students to be safe and effective divers

---

<sup>1</sup>Jon Hardy, Report Justifying Repeal of the Los Angeles County SCUBA Diving Ordinance (Ashton: CNCA Headquarters, 1974), pp. 67-74.

<sup>2</sup>Ibid., p. 71.

because the instructors are not adequately trained; are unethical in their conduct; do not meet standards; do not stay current in the field; or use unsafe practices during training.<sup>1</sup>

It was felt that the student diver had problems arising from several sources among which are the following: lack of training, mental, and physical inadequacies.<sup>2</sup>

### Psychological Traits of Divers

Biersner found that divers were psychologically normal in every case, although more aggressive, nonconforming, and active than the other groups, including fleet sailors. He also observed that divers were more willing to take risks in gambling situations and to be less concerned about personal problems as well as illnesses.<sup>3</sup> Biersner also stated the following:

The highly experienced divers on Sea-Lab II were shown to be normal in comparison to the average American adult male on an extensive battery of psychological tests. In addition, those divers most highly rated by team leaders were found to spend more time in the water, made more diving excursions from the underwater habitat, reported less fear and more satisfaction, completed more underwater tasks, and were less dependent on other members of the diving team, including the team leader. Several demographic factors, including size of hometown and birth order were also found to be significantly related to diving performance.<sup>4</sup>

---

<sup>1</sup>Ibid., p. 73.

<sup>2</sup>Ibid.

<sup>3</sup>R.J. Biersner and D.H. Ryman, "Psychiatric Incidence Among Military Divers," Military Medicine 139, pp. 633-635.

<sup>4</sup>Ibid., pp. 633-635.

In an article by Biersner and Cameron the diver was compared with the normal individual, the parachutist, and jet pilot. The diver had similarities which grouped him with the parachutist and the pilot while exhibiting a difference setting him apart from the previous two. Divers were identified by lower affiliation, intraception, and nurturance, and significantly higher scores on change and aggression on the part of the diver.<sup>1</sup> Biersner and Cameron stated:

This suggests that divers tend to be more individualistic, unsympathetic, and unreflective, as well as more aggressive, active, and asocial than control subjects. Divers also have strong needs for change and variety and are probably easily bored.<sup>2</sup>

Both the parachutists and the divers prefer to gamble for larger amounts of money than control groups while betting preference may indicate for SCUBA divers a particular choice of life style and occupational decision.<sup>3</sup>

Zuckerman placed people into varying degrees of sensation seeking comprising four clusters. The clusters included the following headings: (1) Thrill-and Adventure-Seeking, (2) Experience-Seeking, (3) Disinhibition, and (4) Boredom Susceptibility.<sup>4</sup>

---

<sup>1</sup>R.J. Biersner and B.J. Cameron, "Betting Preferences and Personality Characteristics of Navy Divers," Aerospace Medicine 41 (1970): 1289-1291.

<sup>2</sup>Ibid.

<sup>3</sup>Ibid.

<sup>4</sup>Marvin Zuckerman, "The Search for High Sensation," Psychology Today (February 1978): 38-40, 96, 98.

Zuckerman's views differ from those of Freud in that Freud believed sensation seeking behaviors to be an expression of symbolic sexual or death-wish desires, while Zuckerman's theory establishes a desire for an increase of tension, not its reduction on the part of the individual.<sup>1</sup>

Zuckerman believed the following to be characteristics of high sensation seekers: stronger physiological response to novel stimuli of moderate intensity; need for constant variety in stimuli; hypersexuality; extreme sociability; high levels of sex hormones; parental provision for stimulating environments; and involvement in high sensation seeking activities or risk oriented endeavors.<sup>2</sup>

Zuckerman and Link indicated that generally the high sensation seeker tends to be more aware of body sensations, low on anxiety levels, less likely to be psychiatrically disturbed than the low sensation seekers, and a nonconformist. They also found that the high sensation seeker liked the thrill-seeking lifestyle. These included speed, danger, out of the ordinary type of stimulations, cold, camping, and sensations which might be uncomfortable to others. Simply stated, the high sensation seeker needs change, independence, and may need others as an audience to his own performance.

---

<sup>1</sup>Ibid.

<sup>2</sup>Ibid.

The low sensation seeker needs order, predictability, and some degree of stability in his life.<sup>1</sup>

In the pilot study involving some of these variables, Rose administered a battery of psychological tests to twenty-five males and females in a SCUBA certification class at the beginning of the semester. These tests included the Spielberger State-Trait Anxiety Inventory; the Sensation Seeking Scale; Rotter's Locus of Control Scale; the Crowne-Marlowe Social Desirability Scale; and the Bem-Sex Role Inventory. Background information requested included age, sex, and birth order.<sup>2</sup>

Reaction to stress in a controlled situation was obtained during a pool dive, and the State Inventory was administered at this point. An overall rating of each student's performance was obtained at the end of the semester from the three instructors. At the out-dive, the final requirement for certification, a record was kept of the number of dives, the depth of dives, and the lengths of time of each dive for each student.

The pilot study resulted in several relevant findings. First, compared with national and local norms, SCUBA students were significantly less anxious, higher in sensation seeking

---

<sup>1</sup>M. Zuckerman and K. Link, "Construct Validity for the Sensation-Seeking Scale," Journal of Consulting and Clinical Psychology 32 (1968): 420-6.

<sup>2</sup>K.G. Rose and S.R. Heyman, "Prediction of Performance in SCUBA Divers," paper presented at the 1979 YMCA SCUBA Instructor's Convention, Key West Florida, 18 May 1979.

behaviors, and more internal in locus of control, ( $p < .05$ ). Males and females were more likely to fall into masculine and androgynous sex role groups than the general population. The only significant difference between males and females on the personality scales emerged on the feminine adjectives of the BSRK, with females being higher. Males did show a non significant trend ( $p = < .10$ ) to be higher on the masculine adjectives.<sup>1</sup>

Consistent with research in other areas while first borns were highest on self-described sensation seeking needs, they showed the least risk-taking behavior on the out-dive. Middle and last borns made more dives, dove more deeply, and stayed down for longer periods of time.<sup>2</sup>

Although no sex-differences were expected in performance, males and females were similar on psychological tests. However, males made significantly more dives, and stayed down for longer periods of time than females.<sup>3</sup>

Perhaps of greatest importance, significant correlations indicated that males as a group, individuals low in trait anxiety, internal in locus of control, and low in sensation seeking dove most deeply. Males high in sensation seeking stayed down for the greater lengths of time. Multiple regression equations performed stepwise with these variables were significant ( $r$ 's = .51 to .55  $p < .01$ ). Except for sex

---

<sup>1</sup>Ibid.

<sup>2</sup>Ibid.

<sup>3</sup>Ibid.

differences and birth order, no other variables related to number of dives.<sup>1</sup> The results found in the pilot study were consistent with previous research on psychological factors affecting participation in high-risk sports, and performance in these sports.

If the SCUBA instructor could identify characteristics beneficial to the pursuance of the sport as well as those which are a hindrance to the successful completion of the course, he could offer specialized instruction to individuals needing help. Administrators in health, physical education, and recreation would be aided in scheduling of outdoor education labs by indications of need based on exam scores. Potential dropouts could be identified and encouraged to seek help and continue their diving education.

Much of the early research into the psychological factors affecting sport performance in the United States tried to isolate basic "personality patterns" of athletes. This research became somewhat futile, in that athletes in different sports seemed to have different personality patterns. Further, athletes in the same sports may often differ with each other. For example, high school football players differ from college players, who differ from professional players.

---

<sup>1</sup>Ibid.

### Prediction of Performance of Divers

Some research indicates that birth order and education have been associated with success in hazardous diving situations. Radloff and Helmreich stated that:

The older-born did not make as many actual dives as did the younger-born, the results for these SCUBA trainees indicated that the older-born succeeded significantly more often than did the younger-born. These results indicated that factors associated with success in training may not necessarily be related to success under actual diving conditions.<sup>1</sup>

There was also evidence that the individual's feeling or attitude toward himself was a factor. Subjects feeling that they were better leaders passed the course more often. There were indications that trainees indicating fewer emotional and visual problems experienced greater degrees of success.<sup>2</sup>

There seems to have been some success in the prediction of performance relative to physical fitness and psychological assessment test and evaluations. There were significant correlations between trainee success and age, ability in swimming tests, and physical fitness measures. Gunderson, Rahe, and Arthur found a positive correlation between physical fitness measures and UDT trainee success.

---

<sup>1</sup>R. Radloff and R. Helmreich, Groups Under Stress (New York: Appleton-Century-Crofts, 1968).

<sup>2</sup>R.J. Biersner and D.H. Ryman, "Prediction of SCUBA Training Performance," Journal of Applied Psychology 59 (1974): 519-21.

They also found that emotional health is of unique importance in predicting success of trainees.<sup>1</sup>

Just what psychological additives influence the success of the diver are still in question; however, there seem to be several identifiable attitudes which are predictive of diving training success. Ryman and Biersner indicated that ratings by Army commanders were related to the individuals' attitudes toward combat and physical injury. This study indicated concern about the training was inversely proportional while training confidence was significantly directly proportional to success.<sup>2</sup> Individuals are more likely to succeed under conditions in which some amount of failure occurs.

With regard to birth order, Nisbett found that first borns were overrepresented in college samples, and that the chances of an individual participating in a dangerous sport increases with family size. He found that first borns are less likely to play a dangerous sport than later borns, and that first borns seem to be more fearful than later borns.<sup>3</sup>

---

<sup>1</sup>E.K. Gunderson, R.H. Rage, and R.J. Arthur, "Prediction of Performance in Stressful Underwater Demolition Training," Journal of Applied Psychology 56 (1972): 340-2.

<sup>2</sup>D.H. Ryman and R.J. Biersner, "Attitudes Predictive of Diving Training Success," Personnel Psychology 28 (1975): 181-8.

<sup>3</sup>Richard E. Nisbett, "Birth Order and Participation in Dangerous Sports," Journal of Personality and Social Psychology Vol. 8 No. 4 (1968): 351-3.

Another pattern emerges when considering eye color.

According to studies made by Dr. Morgan Worthy:

Dark-eyed animals, human and nonhuman, specialize in behaviors that require sensitivity, speed and reactive responses; light-eyed animals, human and nonhuman, specialize in behaviors that require hesitation, inhibition and self-paced responses.<sup>1</sup>

Willingness and cooperation shown by participants themselves seems to be an indication of astronaut selection according to Chambers and Fried.<sup>2</sup> To go one step further, evidence that self-selection is a more than effective device for initial screening of individuals who are superior in performance and motivation has been found by Ambler et al.<sup>3</sup>

#### Summary

The background literature indicated the general studies and research related to risk recreation. It identified the importance of high adventure pursuits to the present population, and their level of involvement. It also identified areas of present endeavor and programming being developed by several organizations and institutions. Education was concluded by several studies as the key to

---

<sup>1</sup>Morgan Worth, Eye Color, Sex and Race (Anderson: Droke House/Hallux, 1974), p. 11.

<sup>2</sup>Randall M. Chambers and Robert Fried, Physiology of Man in Space, Psychological Aspects of Space Flight (New York: Academic Press Inc., 1963), pp. 246-7.

<sup>3</sup>R.K. Ambler, J.R. Berkshire, and W.F. O'Connor, U.S. Naval School of Aviation Med., Rept. No. 33, (1961).

proper and safe risk recreation exposure. Risk activities were used in some studies as a methodology for behavior modification in youth.

The SCUBA diving research section presented literature involved with diving. The studies were both private and military in nature. It was found that diving could present a very real danger to the unprepared. Problematic areas contributing to hazards in diving were equipment, retail merchants, divers themselves, and their training.

The section addressing psychological traits of divers concluded that divers were psychologically normal. The divers, however, exhibited similarities to other risk activity participants. Some of these traits can be identified by established written psychological instruments.

The prediction of performance section concluded that there were indications personal and physical characteristics could and have been successfully used in predicting performance in hazardous activity situations. Attitudes about oneself and to the surroundings also play an important role in the determination of projected performance.

## CHAPTER III

### METHODOLOGY

#### Population and Sample

The population sample included potentially all university students enrolled at Southwestern Oklahoma State University, Weatherford, Oklahoma.

The test sample included seventy-six students enrolled either full-time or part-time at Southwestern Oklahoma State University and subsequently enrolled in Basic SCUBA. There were forty males, and twelve females making up the total sample. The students enrolled in a two-hour college credit basic SCUBA class.

The students represented different majors from the different schools and departments across campus. The course credit counted as active physical education credit of which each student at Southwestern must compile four for graduation with an undergraduate degree.

The class consisted of a total forty-four hours of instruction. It was broken down into eighteen hours pool work, eighteen hours classroom preparation, and the remainder open water work. The sample was not a random sample because of the nature of the course and study. Each student selected

himself or herself into the class and will of necessity received the same training. The fact that the student enrolled in the course sets him apart from the general population.

### Instrumentation

With the exception of the outdive evaluation, and the pool skill test, all of the psychological tests used were well known and developed by noted persons in the field of psychology.

The first test was the Attitude Towards Physical Activity (ATPA)-Kenyon. He devised an attitude questionnaire to measure six attitudes toward six aspects of physical activities for: social experience (interaction/meeting others); health and fitness; pursuit of vertigo; the aesthetic experience; catharsis; and the ascetic experience.<sup>1</sup> The ATPA would differentiate different attitudes possessed by SCUBA students about physical activities which are not present in norm groups in addition to the possible relationship of attitudes and performance.

The attitude toward physical activity is normed on the University of Wisconsin college men and women. The reliability coefficients based upon Hoyt's procedure,<sup>2</sup>

---

<sup>1</sup>G.S. Kenyon, "A Conceptual Model for Characterizing Physical Activity," Research Quarterly 39 (1968a): 96-105; G.S. Kenyon, "Six Scales for Assessing Attitude Toward Physical Activity," Research Quarterly 39 (1968b): 566-74.

<sup>2</sup>G. Hoyt, "Test Reliability Estimated by Analysis of Variance," Psychometrika 6 (1941): 153-60.

response frequencies, and item discrimination statistics were computed for each of six scales. The reliability of each scale was maximized by rescaling the a priori weights of the best items using a reciprocal averages procedure.<sup>1</sup>

Hoyt reliabilities for the six scales of Forms CM and SW are available. Reliabilities were lowest for the social experience scale (.72 and .72 respectively), and highest for the pursuit of vertigo scale (.89 and .86 respectively).<sup>2</sup>

Scale scores differentiated between strong and weak preference groups in the predicted direction for all scales except catharsis.<sup>3</sup> The validity of the catharsis has not been established. Scale validation information is available.

The second test used was the BSRI-Bem Sex Role Inventory. Constantiople provided the basic theoretical re-thinking on masculinity and femininity as psychological traits. Instead of their being thought of--and measured--as end points on a single continuum, and hence oppositional in nature, masculinity and femininity can be thought of as distinct behavior patterns. Individuals can be high in one and low in the other (that is, preferring either masculine

---

<sup>1</sup>F.B. Baker, "Univac Scientific Computer Program for Scaling of Psychological Inventories by the Method of Reciprocal Averages," Behavioral Science 5 (1960): 268-9.

<sup>2</sup>Ibid.

<sup>3</sup>W.P. Morgan, Contemporary Readings in Sport Psychology, (Springfield: Charles C. Thomas, 1970), 89-93.

or feminine patterns) or they can be high in both--androgynous. Similarly, individuals may have no strong preference for either behavior characteristics, the undifferentiated type.<sup>1</sup> The BSRI is composed of sixty words or phrases which an individual can rate on a scale from one to seven, according to how little or how much the individual thinks these words or phrases characterize themselves. Twenty of the items identify masculine attributes, twenty identify feminine attributes, and twenty are "filler" items. Research with the instrument has supported the assumptions of different behavior patterns by the groups.<sup>2</sup>

A student's score is computed as a t-ratio for the difference between the total points assigned to the feminine and masculine attributes, respectively. The t-ratio is used rather than a simple difference score primarily because it allows the researcher to ask whether a person's masculinity and femininity scores differ significantly from one another and if they do ( $t > 2.025$ ,  $p < .05$ ), to characterize that person as significantly sex-typed or sex reversed.<sup>3</sup>

The BSRI was normed on 2,000 undergraduates from both a university and a community college.

---

<sup>1</sup>A. Constantiople, "Masculinity-femininity: an exception to a famous dictum," Psychological Bulletin 80 (1973): 389-407.

<sup>2</sup>S.L. Bem, "The Measurement of Psychological Androgyny," Journal of Consulting and Clinical Psychology 42 (1974): 155-62.

<sup>3</sup>Ibid.

Psychometric analyses on the BSRI indicates that it is quite satisfactory as a measuring instrument.

The masculinity and femininity scores turned out to be empirically as well as conceptually independent (average  $r=.03$ ). The  $t$ -ratio itself is internally consistent (average  $r=.86$ ), reliable over a four-week interval (average  $r=.93$ ), and uncorrelated with the tendency to describe oneself in a socially desirable direction (average  $r+.06$ ).<sup>1</sup>

Information on the Bem Sex Role Inventory was gathered initially in 1973 from 444 male and 279 female students in an introductory psychology class at Stanford. The results obtained in earlier and later tests proved to be identical to those gathered in different introductory psychology classes at Stanford.<sup>2</sup>

In a later study by Bem using the BSRI in sex typing and androgyny, the overall analyses of variance also revealed a number of significant findings. There was a significant main effect of sex for the composite measure of observed nurturance, for facial reactions, and for head nods.<sup>3</sup> In order they are:

$F(1, 78) = 4.83, p < .03$	observed nurturance,
$F(1, 78) = 6.90, p < .01$	for facial reactions,
$F(1, 78) = 8.50, p < .005$	and for head nods <sup>4</sup>

---

<sup>1</sup>Ibid.

<sup>2</sup>Ibid.

<sup>3</sup>Sandra L. Bem, "Sex Role Adaptability: One Consequence of Psychological Androgyny," Journal of Personality and Social Psychology Vol. 31, No. 4, (1975): 636.

<sup>4</sup>Sandra L. Bem, Wendy Martyna and Carol Watson, "Sex Typing and Androgyny: Further Explorations of the Expressive Domain," Journal of Personality and Social Psychology, Vol. 34, No. 5 (1976): 1021-1022.

In the same study using the subjects' responsiveness to infants as a criterion for measurement a mean correlation for the behaviors was +.24 yielding an internal reliability (coefficient alpha) of +.62 for the composite.<sup>1</sup>

Additional supportive data for the BSRI was developed by Bem using judges to rate the desirability of approximately 200 personality attributes being either masculine or feminine. The ratings consistency across four independent samples of judges is strong evidence that the BSRI is tapping widely known cultural definitions, as stipulated by the theory.<sup>2</sup> The Bem Sex Role Inventory has been normed on the undergraduate college student sample at Southwestern.

The third test is the Internal-External Locus of Control Scale. Rotter assumes that individuals vary in their perception of the control of the events in their lives. His scale measures different reflections of these views, such that individuals low on his scale reflect people "internal" in orientation, who perceive themselves as the controlling agent in their destiny, while individuals higher on the scale, who are called "external" in orientation, believe outside forces and situations control their destiny. Since SCUBA involved a great deal of practice and self-control,

---

<sup>1</sup>J.O. Nunnally, Psychometric Theory, (New York: McGraw-Hill, 1967).

<sup>2</sup>Sandra Lipsitz Bem, "Theory and Measurement of Androgyny: A Reply to the Pedhazur-Tetenbaum and Locksley-Colten Critiques," Journal of Personality and Social Psychology, 37 No. 6 (1979): 1047-1054.

the scale would be used to compare to norm groups to see if students are more internal or external in locus (one would expect them to be more internal), and one would expect better performers to be more internal.<sup>1</sup>

The Rotter internal external scale is the most used of the I-E scales.<sup>2</sup> The determination of a typical score on the test is difficult since there is variation from study to study. This does not take away from the validity of the test. The emphasis lies in the interpretation of the data. The test has been normed on several groups and characteristic scoring developed. One of the recent studies (1970) was carried out by Schneider involving University of Oklahoma students.<sup>3</sup>

Internal consistency reported by Rotter reported reliabilities for several samples that ranged from .65 to .79.<sup>4</sup> This indicates a moderate but rather uniform set of internal consistency estimates.

The test-retest reliability for the test appears adequate. Rotter reported reliabilities for several samples

---

<sup>1</sup>J.E. Phares, Locus of Control in Personality, (Morristown: General Learning Press, 1976).

<sup>2</sup>Ibid.

<sup>3</sup>J.M. Schneider, "College Students' Belief in Personal Control," 1966-1970. Journal of Individual Psychology, (1971): 7, 188.

<sup>4</sup>J.B. Rotter, "Generalized Expectancies for Internal Versus External Control of Reinforcement," Psychological Monographs, 80, 1966 (1, Whole No. 609).

that vary from .49 to .83, depending upon the time interval and the sample involved.<sup>1</sup> Kiehlbauch found reliability coefficients of .75, .39, and .26 in reformatory samples over three-, six-, and nine-month intervals.<sup>2</sup> Phares states that "In general, from a psychometric point of view, test-retest reliability of the scale appears adequate."<sup>3</sup>

The fourth test used was the Sensation Seeking Scale. Zuckerman identifies sensation seekers on a scale of forty items. Subjects are asked to rate themselves on a wide variety of interests and experiences. More than ten thousand persons in countries around the world have taken the test, which includes several pairs of selected answers.<sup>4</sup> The test has gone through five versions, and will be further refined as new material is available.<sup>5</sup> Norms for students at Southwestern Oklahoma State University are available.

In developing construct validity for the sensation-seeking scale, Zuckerman et al, found the SSS to be positively and significantly correlated with the F, Psychopathic

---

<sup>1</sup>Ibid.

<sup>2</sup>J.B. Kiehlbauch, "Selected Changes Over Time in Internal-External Control Expectancies of Reformatory Population" (Ph.D. dissertation, Kansas State University, 1967).

<sup>3</sup>J.E. Phares, Locus of Control in Personality, (Morristown: General Learning Press, 1976).

<sup>4</sup>M. Zuckerman, "The Sensation-Seeking Motive," Progress in Experimental Personality Research 7 (1974).

<sup>5</sup>M. Zuckerman, "The Search for High Sensation," Psychology Today (February 1978): 38-40, 96, 98.

Deviance (PD), and Hypo-mania (Ma) scales of the MMPI.<sup>1</sup> These results would indicate that high sensation seekers tend to be deviant and somewhat antisocial, excitable, and overactive.<sup>2</sup> Myers found a significant correlation between the Insolence scale and the activity, dominance, and impulsivity trait measures and the SSS.<sup>3</sup> Myers and Farley found moderate and positive correlations between the SSS<sup>4</sup> and extraversion scales developed by Eysenck.<sup>5</sup>

According to Zuckerman, Schultz, and Hopkins, other construct validity of the SSS arises from population comparisons.<sup>6</sup> They found volunteers for experiments in sensory deprivation or hypnosis were significantly higher than non-volunteers on the SSS. Berkowitz found that when Thai

---

<sup>1</sup>M. Zuckerman, H. Persky, T.R. Hopkins, T. Murtaugh, G.K. Basu, and M. Schilling, "Comparison of Stress Effects of Perceptual and Social Isolation," Archives of General Psychiatry 4 (1966): 356-65.

<sup>2</sup>M. Zuckerman and K. Link, "Construct Validity for the Sensation-Seeking Scale," Journal of Consulting and Clinical Psychology 32 (1968): 420-6.

<sup>3</sup>T.I. Myers, "Personal Communication with Marvin Zuckerman," (August 1967).

<sup>4</sup>F.H. Farley and S.V. Farley, "Extraversion and Stimulus-Seeking Motivation," Journal of Consulting Psychology 31 (1967): 215-6.

<sup>5</sup>H.J. Eysenck and S.B.G. Eysenck, Personality Structure and Measurement, (San Diego: Robert R. Knapp), pp. 154-217.

<sup>6</sup>M. Zuckerman, D.P. Schultz, and T.R. Hopkins, "Sensation Seeking and Volunteering for Sensory Deprivation and Hypnosis Experiments," Journal of Consulting Psychology 31 (1967): 358-63.

students were given the SSS they scored significantly lower than American students; while Thai monks scored significantly lower than the Thai students, and Thai females scored lower than Thai males. No gender difference was evident in the American sample.<sup>1</sup>

Zuckerman and Link found the following to be true:

The SSS was positively correlated with autonomy, change, and exhibitionism scores, and negatively correlated with deference, nurturance, orderliness, and affiliation scores on both the Edwards PPS and the Gough-Heilbrun ACL. The SSS correlated positively with Hypomania (MMPI) and Lability (ACL), and negatively with Self-Control (ACL) and Field Dependency.<sup>2</sup>

Zuckerman pointed out that:

The construct validity of the General SSS has been elucidated in a number of students. The theory of optimal level of stimulation in which the SSS is based (Zuckerman, 1969) predicts a negative relationship between Sensation Seeking and age in the range from adolescence to old age.<sup>3</sup>

In a study conducted by Zuckerman, odd-even reliabilities corrected by the Spearman-Brown formula were calculated both at Temple University, used in the derivation of scales, and in an additional sample obtained at the University of North Carolina. The reliabilities of the General SSS and Thrill and Adventure Seeking, Experience Seeking, and Disinhibition subscales were satisfactory in

---

<sup>1</sup>W.R. Berkowitz, "Use of the Sensation-Seeking Scale with Thai Subjects," Psychological Reports 20 (1967): 635-41.

<sup>2</sup>M. Zuckerman, "Dimensions of Sensation-Seeking," Journal of Consulting and Clinical Psychology 36 (1971): 45-52.

<sup>3</sup>Ibid.

both the males and the females in both samples. All but two of the coefficients were in the .70s and .80s. Zuckerman found that in the replication sample, the reliability of the male Boredom Susceptibility subscale dropped from .75 to .56, while the female Boredom Susceptibility subscale dropped from .58 to .36.<sup>1</sup>

The fifth test used was the Spielberger State-Trait Anxiety Test. Spielberger identifies the level of anxiety present in a subject. The State test indicates anxiety present at a given time. State anxiety fluctuates depending on environmental situation at any given time. Trait anxiety is the anxiety present in an individual at all times. This may also change although not as significantly as does the state.<sup>2</sup>

The STAI has been used throughout the country in many different situations. Several studies have used the STAI as a major variable providing continuing input and further evidence as to the construct validity. Studies involving college students were conducted at Vanderbilt University, The University of Illinois, New Mexico State University, again at Vanderbilt University, and Florida State University. The test has been normed against several populations including the undergraduate college population.

---

<sup>1</sup>Ibid.

<sup>2</sup>C.D. Spielberger, R.L. Gorsuch, and R.E. Lushene, The State Trait Anxiety Inventory, Preliminary test manual for Forms, Tallahassee, Florida: Florida State University, 1968.

The STAI (Form X) norms for college students are based on two separate samples of Florida State University students (a) 982 incoming freshman (334 males, 648 females); and (b) 484 undergraduate students (253 males, 231 females). Normalized T-scores (mean = 50; SD = 10) and percentile ranks have been developed for these groups. The STAI was given to the freshmen in orientation sessions prior to entering college. The college undergraduates were all enrolled in an introductory psychology course and were tested during a regular class period. Many of these students were subsequently retested to determine the reliability (stability) of the STAI.<sup>1</sup>

Other norms for the STAI have been developed.

In the determination of test-retest reliability, the correlations for the A-Trait scale proved to be reasonably high, ranging from .73 to .86 in situations involving a sampling of undergraduate college students at Vanderbilt University. The reliabilities for the A-State were quite low ranging from .16 to .54, with a median  $r$  of only .32 for the groups. This was understandable and expected considering the purpose of the A-State. It should measure the specific anxiety levels present at a particular time.<sup>2</sup>

Coefficients for the STAI were computed by the K-R 20 as modified by Cronbach<sup>3</sup> for the normative samples. The reliabilities coefficients ranged from .83 to .92.<sup>4</sup>

---

<sup>1</sup>Ibid.

<sup>2</sup>Ibid.

<sup>3</sup>L.J. Cronbach, "Coefficient Alpha and the Internal Structure of Test," Psychometrika 16 (1951): 297-335.

<sup>4</sup>C.D. Spielberger, R.L. Gorsuch, R.E. Lushene, The State Trait Anxiety Inventory, Preliminary Test Manual for Forms, Tallahassee, Florida: Florida State University, 1968.

Spielberger concluded that:

The test-retest reliability (stability) of the STAI A-Trait scale is relatively high, but stability coefficients for the STAI A-State scale tend to be low, as would be expected for a measure designed to be influenced by situational factors. Both the A-Trait and A-State scales have a high degree of internal consistency.<sup>1</sup>

Evidence of the concurrent validity of the STAI A-Trait scale is realized when compared with the IPAT Anxiety Scale<sup>2</sup>, the Taylor Manifest Anxiety Scale (TMAS)<sup>3</sup>, and the Zuckerman Affect Adjective Checklist (AAC), General Form.<sup>4</sup> The correlations for the STAI, the IPAT, and the TMAS are moderately high for both the college students and patients. It is reasonable to conclude that the three scales can be considered as alternate measures of the A-Trait.

The Out-Dive Evaluation was devised and developed by two YMCA SCUBA instructors and a psychologist. The components of the out-dive evaluation were based on desirable performance and safety criteria. It was comprised of forty-two questions of a multiple choice nature which were completed by YMCA SCUBA Instructors immediately upon ascent on

---

<sup>1</sup>Ibid.

<sup>2</sup>R.B. Cattell and I.H. Scheier, Handbook for the IPAT Anxiety Scale, 2nd ed. (Champaign, Illinois: Institute for Personality and Ability Testing, 1963).

<sup>3</sup>J.A. Taylor, "A Personality Scale of Manifest Anxiety," Journal of Abnormal and Social Psychology, 48 (1953): 285-90.

<sup>4</sup>M. Zuckerman, "The Development of an Affect Adjective Check for the Measurement of Anxiety," Journal of Consulting Psychology, 24 (1960): 457-62.

the first checkout dive. Reliability and validity measurements will be developed and tabulated as the instrument is used.

The sixth test used was the Sports Emotional-Reaction Profile (SERP). The SERP was devised for the individual recreational athlete and is a take off of the Athletic Motivation Inventory (AMI). The AMI was developed and revised over a five-year period and has been given to more than 75,000 athletes at all levels of participation. The SERP identifies the individual's traits by finding out the participant's emotional reactions to the sport. There are forty-two items in the SERP which cover seven separate psychological areas having a bearing on athletics. The areas are: Desire, Assertiveness, Sensitivity, Tension Control, Confidence, Personal Accountability, and Self-Discipline.<sup>1</sup> For each area there are six items devoted to both the positive and negative aspects of the particular area. No local norms have been developed for the SERP.

The seventh test was the Ryman and Biersner Training Attitudes Scale. This test consisted of 25 items used to measure attitudes about training motivation, leadership, and course expectations.<sup>2</sup> A 6-point scale ranging from Disagree

---

<sup>1</sup>Thomas Tutko, Ph.D., Sports Psyching, (Los Angeles: J.P. Tarcher, Inc., 1976), pp. 5-45-50.

<sup>2</sup>David H. Ryman and Robert J. Biersner, "Attitudes Predictive of Diving Training Success," Personnel Psychology, 28 (1975): 181-188.

Strongly (score of one) to Agree Strongly (score of six) was used to measure agreement with each of the 25 items included in the test.<sup>1</sup> Subjects tested included 291 volunteers in the Navy School for Divers Second Class (DSC), 140 volunteers for Preliminary Underwater Demolition Team training (PUDT), and 117 volunteers for the Full Underwater Demolition Team (FUDT) course.

Reliability and validity measures for the Ryman and Biersner Scale are as follows:

The scale developed from the Training Confidence factor was significantly related to training success and vol. Drop in both the DSC validation and cross-validation samples, as well as the PUDT sample. The Training Concern scale was negatively associated with success and positively associated with voluntarily quitting in both the DSC validation and cross-validation samples. Analysis of variance was performed, and *t*-tests for multiple comparisons were used for those scales with significant *F* ratios to determine if these scales significantly discriminated between the pass and the three different failure groups. Those who passed DSC training had significantly lower scores on the Training Concern scale than those in the three failure groups (Pass vs. Vol. *t*=3.36, *p*<.001; Pass vs. Med. *t*=2.40, *p*<.01; Pass vs. Misc. *t*=5.56, *p*<.001).

Those who passed PUDT also had significantly higher Training Confidence scores than those who voluntarily dropped (*t*=3.18, *p*<.01). Similar relationships between training success in FUDT and attitudes were found. Training Confidence was again significantly associated with success (*r*=1.8, *p*<.05) and Vol. Drop (*r*=-.20, *p*<.05).

The Training Concern scale appears to be a subtle measure of fearful attitudes (e.g., family's fear of injury and desire for delay of training) which are especially relevant to DSC training.

---

<sup>1</sup>Ibid.

These results show that under conditions in which failure during training occurs, specific attitudes toward training can be used to select those who will most likely succeed from those who fail. This is especially true for those who voluntarily quit.<sup>1</sup>

The last of the test was the pool skill test. It involved a one to five rating on ability to perform basic watermanship skills necessary to dive safely and comfortably. The tests were administered by YMCA SCUBA Instructors during a regular class. The skill test was devised by five YMCA SCUBA Instructors over a four-year period. It emphasizes the safety aspects of diving; it tests competence in water, work under physical stress and time stress; and it tests ability to cope with underwater problems under normal and abnormal conditions. Reliability and validity measurements will be developed and tabulated as the instrument is used.

For comparison purposes, local norms have been developed for all the major psychological tests with the exception of Locus of Control. One-hundred fifty-six male and 184 female students represent a sampling of undergraduates in general education, representing all majors and potential majors. The means, and standard deviations for each scale for males and females are presented in Table 1.

---

<sup>1</sup>David H. Ryman and Robert J. Biersner, "Attitudes Predictive of Diving Training Success," Personnel Psychology, 28 (1975): 181-188.

TABLE 1

MEANS AND STANDARD DEVIATIONS FOR SENSATION SEEKING,  
ATTITUDE TOWARD PHYSICAL ACTIVITY, AND THE BEM SEX  
ROLE INVENTORY FOR MALES AND FEMALES

	<u>Males</u>		<u>Females</u>	
	Mean	Standard Deviation	Mean	Standard Deviation
SS-disinhibition	4.80	3.00	3.81	2.75
SS-boredom suscept.	3.11	1.69	2.46	1.80
SS-thrill and adv.	7.16	2.74	6.27	2.55
SS-experience	4.89	2.25	4.92	2.47
SS-total	19.94	6.28	17.44	6.14
ATPA-01	41.48	5.10	41.50	6.11
ATPA-02	40.27	4.74	41.04	5.17
ATPA-03	40.81	4.74	40.87	6.16
ATPA-04	37.69	4.35	45.50	5.02
ATPA-05	37.27	4.35	38.82	6.22
ATPA-06	43.25	4.91	51.47	9.68
Masc. (BSRI)	103.11	13.06	98.96	13.82
Fem (BSRI)	92.26	9.56	103.32	11.27

### Research Design

The research was designed to look at variables that relate to, and may be predictive of success in SCUBA training. At the beginning of the semester, students were given the battery of tests that were considered to be related to and predictive of success at SCUBA. During the semester, there was testing of performance on poolside tasks. That served two purposes. First, the relationship of the personality and fitness measures will be analyzed with regard to the poolside performance. Second, at the end of the semester, data on the performance of students at the

out-dive was collected. This was related to both the personality and fitness data collected at the beginning of the semester, and the ratings of poolside abilities collected towards the end of the semester.

Subjects in this study selected themselves into a particular class, and based on previous research, were expected to be different from the general population. They cannot be described as a "random" sample.

All subjects received the same training. Subjects could not be pre-tested on the final performance variables of the out-dive.

The research design did not fit the classical experimental models described by Campbell and Stanley.<sup>1</sup> In some ways the data were collected as a by-product of an ongoing activity. The students actively participated as subjects only when they filled out the questionnaires. This process resembles the "unobtrusive" designs described by Webb, et al.<sup>2</sup>

This design presumes that despite the equivalent training received by all students, certain personality variables will be related to success. If these hypotheses are supported, then the predictability of these outcomes

---

<sup>1</sup>D.T. Campbell, and J.C. Stanley, "Experimental and Quasiexperimental Designs for Research on Teaching," Handbook of Research on Teaching, ed. N.L. Gage (Chicago: Rand McNally, 1963), pp. 171-246.

<sup>2</sup>E.J. Webb et al., Unobtrusive Measures: Nonreactive Research in the Social Sciences, (Chicago: Rand McNally, 1966).

allow for modification of training variables. This design also allows for the comparison of subjects by certain variables specified before the class begins. Such variables include sex and birth order.

### Choice of Statistics

For the comparisons of means between two groups, t-tests were used, with the appropriate F tests to examine for the required homogeneity of variances.<sup>1</sup> Such tests, included differences between males and females as scored and rated on the different tests and evaluations.

When differences in means between three or more groups were examined, then a one-way Analysis of Variance (ANOVA) was used. The computer program (SPSS)<sup>2</sup> to be utilized in data analysis provides several built-in programs including Bartlett's Box F and Cochran's test to test for homogeneity of variance. Subjects being compared by birth order is one example of a use of the one-way ANOVA as applied in this report.

To determine if a linear correlation existed between variables, the Pearson product-moment correlation (Pearson's r) was computed.<sup>3</sup> This was used to examine the

---

<sup>1</sup>R.L.D. Wright, Understanding Statistics, (New York: Harcourt Brace Jovanovich, Inc., 1976), pp. 378-9.

<sup>2</sup>The University of Oklahoma Computer Center Operation Manual.

<sup>3</sup>R.L.D. Wright, Understanding Statistics, pp. 247-9.

interrelationships of all measured variables, such that a correlation matrix could be constructed.

A goal of this study was to examine the predictability of certain risk related performances. Multiple regressions were used with open water dive behaviors as a target, and other measured variables as predictors. This will determine if results from previous research are confirmed, as well as examine directions for future research. The contribution of personality scale scores for subjects as predictors in separate regressions for depth of dive, time length of dive, and number of dives is one example of the use to be made of this statistic.

#### Summary of Proposed Methods and Procedures

Students in SCUBA class were given a battery of tests, including the Sensation Seeking Scale; the Rotter I-E Locus of Control Scale; the State-Trait Anxiety Inventory, State Form; the Bem-Sex Role Inventory; and the Attitudes Towards Physical Activity Scale.

Prior to their out-dive, the following pool behaviors were rated by the instructors: a) swimming ability, b) equipment handling, c) mask clearing, d) snorkel clearing, and, e) SCUBA dexterity. The inter-rater reliability were computed, and if acceptable, an average was computed and related to personality data as well as later out-dive behavior.

At the out-dive, the depth of dive, time down, time on surface, and number of dives were recorded for each student. In addition, a form was devised for use by the instructors to chart the progress of the student on their certification dive.

## CHAPTER IV

### ANALYSIS AND INTERPRETATION OF DATA

Chapter IV is an analysis and interpretation of that data which includes written tests and evaluations, results of hypothesis testing, analysis of data, and a summary of findings. The research covers two semesters of Basic SCUBA Students each of which were analyzed separately and labeled as Study 1 and Study 2. Both studies will be presented together.

The purpose of the research effort was to answer these specific questions:

1. What psychological traits exist in high risk activity participants which may be predictive of success?
2. Of what importance is birth order regarding risk sports?
3. Is there a reason for the difference in performance between males and females?
4. Does early performance indicate later success in risk activities?
5. Should administrators of public agencies such as schools, colleges, and universities sponsor risk oriented recreation like SCUBA and others?
6. Is Administration of risk recreation too costly considering liability, safety implications, and the hiring of qualified individuals for instruction?

The following statistical applications were used to analyze the data:

1. t-tests were used to test comparisons between the means of two groups, and a significant t ratio (two tailed) allowed a rejection of the Null Hypothesis of the equality of means.
2. An ANOVA was used to test comparisons between the means of three or more groups, and a significant F ratio allowed for a rejection of the Null hypothesis of equality of means.
3. The Pearson's product-moment correlation (r) was used to test the linear relationship between two sets of data. An r achieving statistical significance allowed a rejection of the Null hypothesis that a linear relationship did not exist between the two data groups.
4. A Chi-square test was used to test the association between groupings of individuals. A significant Chi-square in a 2 X 2 contingency table allowed for a rejection of the Null hypothesis if there was no relationship between the obtained distribution of subjects by group.
5. A factor analysis was used as a multivariate statistical technique in which common relationships among a number of items are found such that they could be grouped together for analysis on common factors.
6. Stepwise multiple regressions (r) were used to examine the combinations of data that might indicate more complex relationships between measures and performance data.

### Results of Hypothesis Testing

#### Results of Testing Ho<sub>1</sub>

Hypothesis one is as follows:

#### Ho<sub>1</sub> Anxiety

There is no significant difference between participants in risk oriented courses and normative population samples in measures of anxiety.

In the first study, for males no significant differences existed in trait anxiety between the norm group and the SCUBA students. For females, however, the SCUBA students ( $N=6$ ,  $M=30.0$ ,  $s=5.62$ ) were significantly less anxious ( $t(188)=3.15$ ,  $p<.005$ ) than the norm group ( $N=184$ ,  $M=38.17$ ,  $s=8.51$ ).

The SCUBA males in the second study ( $N=30$ ,  $M=28.43$ ,  $s=8.30$ ) were significantly lower in Trait Anxiety ( $t(184)=6.06$ ,  $p<.001$ ), than the norm group ( $N=155$ ,  $M=38.62$ ,  $s=6.45$ ).

The females in the second study ( $N=10$ ,  $M=27.6$ ,  $s=6.45$ ) were significantly lower in Trait Anxiety ( $t(192)=4.71$ ,  $p<.001$ ) than the norm group ( $N=184$ ,  $M=38.17$ ,  $s=8.51$ ).

The comparisons reported here suggest that the null hypothesis can be rejected.

### Results of Testing $H_{02}$

Hypothesis two is as follows:

#### $H_{02}$ Sensation Seeking

There is no significant difference between high risk activity participation and the general population with regard to sensation seeking.

No significant differences were obtained in either study for comparisons of subjects to norm groups on sensation seeking. The null hypothesis cannot be rejected in light of obtained data.

### Results of Testing Ho<sub>3</sub>

Hypothesis three is as follows:

#### Ho<sub>3</sub> Locus of Control

There is no significant difference between high risk activity participants and the general population in the locus of control.

In the first study, the SCUBA males ( $N=29$ ,  $M=7.41$ ,  $s=3.41$ ) were significantly lower on the Rotter I-E Scale ( $t(183)=4.47$ ,  $p<.001$ ) than the Norm group males ( $N=156$ ,  $M=10.83$ ,  $s=5.13$ ). The SCUBA females ( $N=7$ ,  $M=6.28$ ,  $s=5.46$ ) were significantly lower on this scale ( $t(189)=2.15$ ,  $p<.05$ ) than the norm group females ( $N=184$ ,  $M=11.14$ ,  $s=5.23$ ).

No significant differences in Locus of Control emerged for the subjects in the second study.

Due to the lack of consistency between the two semesters' data the null hypothesis cannot be rejected.

### Results of Testing Ho<sub>4</sub>

Hypothesis four is as follows:

#### Ho<sub>4</sub> Sex and Sex Role

There is no significant difference between male and female participants in high risk activities in regard to personality traits or performance.

It has been reported that the number of male SCUBA divers heavily outnumbers the number of female divers.<sup>1</sup>  
The results of this first study confirm a previous study<sup>2</sup>

---

<sup>1</sup>"1979 Readers Survey," Skin Diver, Petersen Publishing Company, 1979, p. 3-6.

<sup>2</sup>Rose and Heyman, "Prediction of Performance in SCUBA Divers," 1979 YMCA Convention, 1979.

as again not only did more male than females enroll in the first semester (29 males, 7 females), but that proportionally more females (4) did not finish the course, compared with the males (7) who did not finish ( $\chi^2=2.89$ ,  $df=1$ ,  $p<.10$ ).

Males and females in the first study were compared on all personality and performance variables using 2-tailed  $t$ -tests. The results are summarized in Table 2. The differences on the personality scales indicate males were high on the disinhibition subscale of the SSS, while females were higher on the Experience-seeking subscale. Women reflected a greater preference for an aesthetic orientation toward physical activity. On an item tapping aggression, males more strongly reported that they would prefer to win a boxing match by knocking out an opponent. Females were significantly higher on the Femininity Scale of the BSRI.

More important for the implications of this first study, significant differences emerged in ratings of the performance of diving skills in the pool. On four of the five tasks, males were rated as being significantly better in performance. On the fifty test, bail out gear (MFS) although the  $t$ -tests was not significant, a correlation between sex and performance achieved a marginal level of significance ( $r(30)=-.28$ ,  $p<.08$ ), indicating a trend for males to be rated as performing better.

On two of the sociometric measures in the first study, males were given significantly higher mean rankings

TABLE 2  
SUMMARY OF COMPARISONS OF MALE-FEMALE DIFFERENCES (STUDY 1)

	MALES			FEMALES			<u>t</u>	<u>df</u>
	<u>N</u>	<u><math>\bar{X}</math></u>	<u>S</u>	<u>N</u>	<u><math>\bar{x}</math></u>	<u>S</u>		
SSS-Disinhibition	29	4.97	2.58	7	3.00	2.23	1.85 <sup>a</sup>	34
SSS-Experience Sk.	29	4.17	1.75	7	6.71	1.80	3.15 <sup>e</sup>	34
ATPA-Aesthetic	25	39.36	7.00	6	46.5	6.81	2.12 <sup>b</sup>	29
ATPA-Box	25	5.52	1.75	6	3.00	1.09	3.33 <sup>e</sup>	29
ASRI-Feminity	25	92.36	8.53	6	104.83	12.24	2.17 <sup>b</sup>	29
Skill 01 1st preference as partner	29	8.96	7.37	7	2.42	3.04	2.28 <sup>b</sup>	34
Skill 03 3rd preference as partner	29	7.65	5.45	7	2.42	3.65	2.40 <sup>b</sup>	34
Survival Floating	26	13.65	1.99	4	11.00	2.94	2.33 <sup>b</sup>	28
Surface Dives	26	11.88	1.50	4	10.00	2.16	2.21 <sup>b</sup>	28
Deck Entries	16	13.23	2.12	4	10.50	2.51	2.35 <sup>b</sup>	28
Buddy Breathing	26	13.65	1.67	4	11.25	3.09	2.38 <sup>b</sup>	28
Pool Totals	26	65.16	8.75	4	52.75	13.22	2.46 <sup>b</sup>	28

a =  $p < .10$

b =  $p < .05$

c =  $p < .01$

d =  $p < .10$

e =  $p < .005$

f =  $p < .001$

for selection as partner on first and third sociometric administration than females.

In the second study when compared on all measures, (as is shown in Table 3) differences emerged between males and females: on preferences in physical activities, and with males reflecting more masculine self-descriptions on the BSRI-Masculinity Scale; on two fitness measures, with women having lower resting breathing rates and pulse measures; on two strength measures, with males being able to do significantly more weight, on the pool-rated skills, where lower scores reflected better ratings, women tended to do more poorly. Although no differences emerged on open water dive behaviors, the number of women going on that dive was very small (6).

Again in the second study when males and females are compared by those going on the open-water dive, it is noted that three of 30 men (10%) did not go, while four of 10 women (40%) did not. The resulting  $\chi^2=4.67$ ,  $df=1$ ,  $p<.05$ , indicate sex and fulfillment of this course requirement were related.

The obtained differences make consideration of the data from these studies more difficult. Females, in terms of the performance criteria used, and some personality measures appeared to represent, at a statistical level, a significantly different population from males. Continuing to analyze the data for a pooled sample of males and females

TABLE 3  
SUMMARY OF MALE-FEMALE COMPARISONS (STUDY 2)

	MALES			FEMALES					
	M	N	SD	M	N	SD	df	t	n
ATPA-AESTHETIC	37.75	29	4.94	44.10	10	5.50	"	3.40	.005 <sup>e</sup>
BSRI-Masculinity	111.56	30	9.29	99.50	10	9.57	38	3.53	.001 <sup>f</sup>
BROL	19.64	28	4.62	16.5	8	8.70	34	1.80	.10 <sup>a</sup>
Pulse 01	76.71	28	11.60	67.00	8	8.68	3"	2.19	.05 <sup>b</sup>
Push-Ups	35.67	28	15.29	18.0	9	10.08	35	3.23	.005 <sup>e</sup>
Weight	165.53	28	47.51	102.77	9	39.45	35	3.58	.001 <sup>f</sup>
Underwater Swim	1.62	29	.82	2.33	6	.81	33	1.94	.10 <sup>a</sup>

\*NOTE: Lower scores indicate better performance

a =  $\underline{p} < .10$

b =  $\underline{p} < .05$

c =  $\underline{p} < .02$

d =  $\underline{p} < .01$

e =  $\underline{p} < .005$

f =  $\underline{p} < .001$

blurrings of critical differences for males and females emerged. The small number of women did not allow for a meaningful analysis of the data for females. The need to obtain a larger sample of females, and for such separate study in later research, is clearly indicated. Due to the performance differences between male and female SCUBA students, therefore, when considering data relating to performance, only males were examined.

The null hypothesis was rejected for the assumption of equal performance based on the performance differences for males and females in both studies. It is important to note in both studies females did less well in pool tasks and were less likely to complete the course. Although some personality differences emerge between male and female participants, they are not widespread.

#### Results of Testing Ho<sub>5</sub>

Hypothesis five is as follows:

Ho<sub>5</sub> Birth Order

There is no significant difference between birth order groups in performance or success in high risk sports.

Based on the findings of the differences between males and females, only the data for males will be reported. The number of female SCUBA students in Study 1 (N=6) and Study 2 (N=10) are too small to allow reliable statistical analysis of the data for females.<sup>1</sup>

---

<sup>1</sup>B.J. Winer, Statistical Principles In Experimental Design, Second Edition (New York: McGraw Hill, 1971).

In both studies first borns tended to do better in pool skills; however, on only one pool skill in the second study did a significant correlation emerge, with rated ability on circuits with fins only decreasing across birth order. These are shown in Table 4. On the open-water dive in the first study, there was a trend for the depth of the dive on the first (check-out) dive to increase across birth orders. These are shown in Table 5.

TABLE 4  
SUMMARY OF PEARSON'S  $r$  FOR BIRTH  
ORDER FOR SECOND SEMESTER

Measure	$r$	$n$	$\underline{n}$
SS-Disinhibition	.52	20	.005e
SS-Thrill A.S.	.38	20	.02c
SS-Total	.47	20	.005e
STATE-1	.32	20	.05b
AIPA-Health & Fitness	.31	29	.05b
ATPA-Vertigo	.26	29	.10a
EPI-Extraversion	.32	30	.05b
EPA-Neuroticism	.41	30	.02c
EPA-Lie	-.35	30	.05b
Training Conformity	-.45	30	.01d
Lead Rating	-.24	30	.10a
PULSE 02	-.35	28	.05b
BR 04	-.35	26	.05b
Circuit-fins	-.47	23	.02c
FEET 01	.29	27	.10a
Group 02	.33	21	.10a

a= $p < .10$  b= $p < .05$  c= $p < .02$  d= $p < .01$  e= $p < .005$  f= $p < .001$

TABLE 5  
SUMMARY OF CORRELATIONS OF DATA WITH  
BIRTH ORDER (1ST STUDY)

Birth Order Measure	<u>r</u>	<u>N</u>	<u>p</u>
Personality data			
Disinhibition	-.39	19	<.05 <sup>b</sup>
Boredom Susceptibility	-.40	19	<.05 <sup>b</sup>
Total Sensation SS	-.50	19	<.02 <sup>c</sup>
ATPA-Social Experience	-.41	19	<.05 <sup>b</sup>
State 04	-.42	13	<.10 <sup>a</sup>
BSRI-Masculinity	-.67	19	<.001 <sup>f</sup>
SERP-Assertiveness	.56	18	<.01 <sup>d</sup>
SERP-Confidence	.43	18	<.05 <sup>b</sup>
SERP-Self-discipline	.65	18	<.005 <sup>e</sup>
Peer Evaluations			
RAT 01 1st Preference as leader	-.45	19	<.05 <sup>b</sup>
RAT 03 3rd Preference as leader	-.62	17	<.005 <sup>e</sup>
Skill 01 1st Preference as partner	-.38	19	<.05 <sup>b</sup>
Skill 02 2nd Preference as partner	-.35	19	<.10 <sup>a</sup>
Skill 03 3rd Preference as partner	-.41	19	<.05 <sup>b</sup>
Performance			
Volunteering for Free Dive	-.47	15	<.05 <sup>b</sup>
Survival Floating	-.42	19	<.05 <sup>b</sup>
Surface Dives	-.39	19	<.05 <sup>b</sup>
Depth, Free Dive	-.52		<.05 <sup>b</sup>
a=p<.10    b=p<.05    c=p<.02    d=p<.01    e=p<.005    f=p<.001			

The data were less clear in the second study, compared to the first study. Due to the fewer significant relationships in the second study, and the absence of any consistent performance differences on the open water dive, the hypothesis was not to be rejected, although there is some support for the rejection. Further study would be required to determine if more consistent patterns between birth order and performance can emerge.

#### Additional Supportive Data

There are important questions for the teaching of high risk sports that the collected data addressed. All adventure sports, as well as other sports, involve training programs. To what extent can a student's performance in initial training be assessed, and how will it relate to actual performance of the high risk sport?

Students spend a great deal of time interacting with each other. Previous research indicates sociometric data can be a valuable assessment of performance, and may be of use to an instructor.<sup>1</sup> Peer assessments may provide information on student performance prior to, and corroborative of, instructor ratings of students.

The relationship of strength and physical fitness to performance also was considered. It is a variable in

---

<sup>1</sup>R.L. Helmreich, "Prolonged Stress in Sea Lab II: A Field Study of Individual and Group Reactions." Unpublished Doctoral Dissertation, Yale University, 1966.

the differences in male-female patterns. Due to the small number of females, this cannot be directly assessed, but some clues may be obtained by examining the relationships of strength and fitness to course performance.

Finally, research in high risk sport and activities indicates personality is an important factor in performance.<sup>1</sup>

This section will describe the results obtained relating to these questions.

It is important to determine to what extent sociometric data can provide information about students' performance. In addition, the pool training's relationship to later performance needs to be assessed as initial safety oriented training is prevalent in any high risk activity.

### Study One

#### Sociometrics

The first study findings are given in Table 6. There were trends for sociometric ratings, two of which were done considerably earlier in the semester, to be related to pool ratings with those selected as partners or leaders performing at better levels.

The data for this section in study one is summarized in Table 7. The correlations between the sociometric data

---

<sup>1</sup>Walter Fenz and Marvin Brown, "Betting Preferences and Personality Characteristics of Sport Parachutists," Aerospace Medicine, February 1968, pp. 173-176; R.L. Helmreich, "Prolonged Stress in Sea Lab II, Unpublished Doctoral Thesis, 1966; K.G. Rose and S.R. Heyman, "Prediction of Performance in SCUBA Divers," 1979 YMCA Convention, 1979.

TABLE 6  
CORRELATION OF POOL RATINGS WITH SOCIOMETRICS AND PERSONALITY DATA

	M Bailout	H Survival Floating	L: Surface Dives	LA Deck Entries	Sn. Buddy Breathing	Pool Total
RAT 01 1st preference as leader	.26 <sup>a</sup>	.33 <sup>b</sup>	.37 <sup>b</sup>	.33 <sup>b</sup>		.30 <sup>a</sup>
RAT 02 2nd preference as leader						
RAT 03 3rd preference as leader	.29 <sup>a</sup>					
SKILL 01 1st preference as partner		.37 <sup>b</sup>	.38 <sup>b</sup>	.33 <sup>b</sup>		.36 <sup>b</sup>
SKILL 02 2nd preference as partner						
SKILL 03 3rd preference as partner	.56 <sup>e</sup>	.38 <sup>b</sup>	.40 <sup>c</sup>	.36 <sup>b</sup>		.46 <sup>d</sup>
Thrill Seeking						
BIRTH	-.42 <sup>b</sup>	-.39 <sup>b</sup>				
STATE 01		-.28 <sup>a</sup>				
STATE 02		-.31(23) <sup>a</sup>				
STATE 03		-.33(22) <sup>a</sup>	.47 <sup>c</sup>			
STATE 04						
MASC.		.41 <sup>c</sup>			.28(25) <sup>a</sup>	.31x(24)

TABLE 6--Continued

	M Bailout	H Survival Floating	L: Surface Dives	LA Deck Entries	Sn. Buddy Breathing	Pool Total
Catharsis - ATPA		-.35 <sup>b</sup>			.27 <sup>a</sup>	-.30 <sup>x</sup>
SERP - Association		-.49				-.31 <sup>x</sup> (19)
SERP - Tensions Control	-.34 <sup>a</sup>		-.51 <sup>d</sup>			
SS 03			.28 <sup>a</sup>			
Self-Discipline		-.71 <sup>d</sup>		-.40 <sup>b</sup>	-.45 <sup>b</sup> (20)	-.59 <sup>d</sup> (19)

a =  $\underline{p} < .10$     b =  $\underline{p} < .05$     c =  $\underline{p} < .02$     d =  $\underline{p} < .01$     e =  $\underline{p} < .005$     f =  $\underline{p} < .001$

NOTE: For RAT SKILL ratings N = 24, for others, N = 20

Leader-Partner

TABLE 7

SUMMARY OF CORRELATIONS OF OUT-DIVE BEHAVIORS WITH SOCIOMETRIC  
AND PERSONALITY DATA (First Semester)

	Feet 01	Time 01	Feet 02	Time 02	Order for Volunteering	Dives	Volunteering (V01) Order for free dive	Grade
RAT 01 (1st choice as leader)	29 (22) <sup>a</sup>		31 (20) <sup>a</sup>		-41 <sup>b</sup> (22)			
RAT 02 (2nd choice as leader)				-45 <sup>b</sup> (20)				
RAT 03 (3rd choice as leader)			33 <sup>a</sup> (18)					
SS01 Disinhibition			38 (20)			-61 <sup>e</sup> (22)		
SS02 Boredom Sus- ceptibility	-39 <sup>b</sup> (22)		34 <sup>a</sup> (20)			-27 <sup>a</sup> (29)		
SS03 Thrill & Adventure								
SS04 Experience Seeking								
SS05 Total Sen. Seeking			32 <sup>a</sup> (25)				-32 <sup>a</sup> (30)	
Birth							-47	
Trait Anxiety	-48 <sup>c</sup> (22)							

TABLE 7--Continued

	Feet 01	Time 01	Feet 02	Time 02	Order for Volunteering	Dives	Volunteering (V01) Order for free dive	Grade
St 01 State Anxiety			-39 <sup>b</sup> (20)					
Rotter				44 <sup>b</sup> (20)				
KN-ATPA	-31 (21)		-31 <sup>a</sup> (20)		-37 <sup>b</sup> (21)			-37 <sup>b</sup> (22)
Health and Fitness					-45 <sup>c</sup> (21)			
Pursuit of Vertigo			31 <sup>a</sup> (20)		-49 <sup>c</sup> (21)	30 <sup>a</sup> (25)		
Aesthetic Experience	-40 <sup>b</sup> (21)	34 <sup>a</sup> (21)	30 <sup>a</sup> (20)					-41 <sup>b</sup> (22)
Catharsis	-46 <sup>c</sup> (21)							
Ascetic Experience	-30 <sup>b</sup> (21)		30 <sup>a</sup> (30)		-42 <sup>b</sup> (21)			
AG01-Desire to fight			33 <sup>a</sup> (20)		-30 <sup>a</sup> (21)			
AG02-Desire to win fight					39 <sup>a</sup> (21)			
AG03 (AG01+AG02)								

TABLE 7--Continued

	Feet 01	Time 01	Feet 02	Time 02	Order for Volunteering	Dives	Volunteering (V01) Order for free dive	Grade
EPI-Extroversion								
N - euroticism								
Lie						45 <sup>b</sup> (20)		
St02 1 hr. before	-40 <sup>b</sup> (22)	29 <sup>a</sup> (22)						
St03 right before	-37 <sup>b</sup> (27)					38 <sup>b</sup> (22)		
St04 right after								
VOL				-55 <sup>d</sup> (18)		-33 <sup>a</sup> (20)		
MASC			44 <sup>b</sup> (20)					
FEM				48 <sup>c</sup> (20)			37 <sup>b</sup> (20)	-36 <sup>b</sup> (22)
SERP0 -Desire				46 <sup>b</sup> (15)	-57 <sup>d</sup>			
SERP0 -Assertive- ness			-53 <sup>c</sup> (15)	35 <sup>a</sup> (15)	37 <sup>a</sup>			

TABLE 7--Continued

	Feet 01	Time 01	Feet 02	Time 02	Order for Volunteering	Dives	Volunteering (V01) Order for free dive	Grade
SERPO -Sensitivity	-44 <sup>b</sup> (16)		71 <sup>f</sup> (15)	47 <sup>b</sup> (15)	-45 <sup>b</sup> (16)	-30 <sup>a</sup> (20)		
SERPO -Tension Control			-60 <sup>d</sup>			49 <sup>c</sup> (20)		
SERPO -Confidence			-76 <sup>f</sup> (15)			37 <sup>b</sup> (20)		
SERPO -Personality Accountability								
SERPO -Self Dis- cipline			-55 <sup>c</sup> (15)		49 <sup>b</sup> (16)			
Skill 01 (1st choice as Partner	36 <sup>b</sup> (32)		47 <sup>c</sup> (20)		-41 <sup>b</sup> (22)	44 <sup>d</sup> (29)	34 <sup>d</sup> (20)	33 <sup>a</sup> (23)
Skill 02 (2st choice as Partner				-41 <sup>b</sup> (20)				
Skill 03 (3rd choice as Partner			39 <sup>b</sup> (20)		-60 <sup>c</sup> (22)			
Bailout w/gear (MFS)		-38 <sup>b</sup> (22)			-43 <sup>c</sup> (20)		-34 <sup>a</sup> (20)	
Survival Floating	51 <sup>a</sup> (23)	59 <sup>e</sup> (22)			-45 <sup>c</sup> (22)			

TABLE 7--Continued

	Feet 01	Time 01	Feet 02	Time 02	Order for Volunteering	Dives	Volunteering (V01) Order for free dive	Grade
Surface dives	45 <sup>c</sup> (22)	-50 <sup>d</sup> (22)		29 <sup>a</sup> (20)				
Deck entries	50 <sup>d</sup> (22)	-55 <sup>e</sup> (22)			-33 <sup>a</sup> (22)			-33 <sup>a</sup> (25)
Buddy breathing w/snorkel	46 <sup>c</sup> (22)	-54 <sup>e</sup> (22)						
	44 <sup>c</sup> (22)	-58 <sup>e</sup> (22)			-42 <sup>b</sup> (22)			
a = $\underline{p} < .10$ b = $\underline{p} < .05$ c = $\underline{p} < .02$ d = $\underline{p} < .01$ e = $\underline{p} < .005$ f = $\underline{p} < .001$								

and out-dive behavior yielded positive correlations with time and depth. This suggested students rated more highly by peers were more likely to go down more deeply, and stay down longer. The negative correlations with order of entry for the check out-dive indicates that those students with higher peer evaluations were more likely to volunteer earlier for skills assessment tasks.

When the personality and sociometric data for study one is utilized using a multiple regression, for depth of check-out dive  $R=.92$ ,  $F(3,19)=33.7$ ,  $p<.001$ , with Trait Anxiety, ( $r=-.48$ ), SERP-Sensitivity ( $r=-.48$ ), and SERP-Self Discipline, ( $r=-.27$ ) contributing. No significant regression emerged for the time down of the check-out dive. For the Depth on the Free Dive, an  $R=.94$ ,  $F(2,10)=40.38$ ,  $p<.001$  emerged, with the SERP Confidence ( $R=-.74$ ) and ATPA-Pursuit of Vertigo ( $R=.31$ ) contributing.

In a multiple regression for study one for the time length of the second dive,  $R=.92$ ,  $F(3,9)=18.10$ , ( $p<.01$ ) correlated with volunteering ( $R=-.55$ ), the third sociometric leader rating ( $R=.21$ ), and SERP 02 ( $R=.35$ ) contributing.

### Pool Training and Ratings

In the first study, intercorrelations for the three raters on each of the five pool skills were computed. The fifteen correlations ranged from a low of .04 to a high of .69, with a mean of .38 and a median of .39. Eleven of the correlations achieved significance at the .05 level of

confidence. Ratings by the raters on each behavior for the subjects were summed, and intercorrelated for the five rated skills. The emerging correlations ranged from a low of .47 to a high of .82, with a mean of .68 and a median of .71. All of the correlations were significant at the .01 level.

As can be seen by examining the data in Table 6, several relationships emerged between personality scales and pool ratings in Study 1. All of the State Anxiety measures had significant negative relationships with survival floating while BSRI-Masculinity had a positive relationship with this variable. The ATPA Catharsis had a negative relationship with survival floating, while two SERP scales had negative relationships with it. Those who, at the open water dive, reported themselves more anxious prior to the dive (ST02) had lower ratings on the surface dives.

In the first study, a relatively consistent pattern emerged in which ratings of pool performance correlated positively with depth of the first dive, and negatively with the length of time of the first dive ( $r = -.65$ ,  $p < .001$ ). Three of the five pool behaviors, and the total pool score, correlated negatively with the order in which people volunteered for the check-out dive, such that people volunteering earlier were likely to have higher pool ratings. The intercorrelations of pool performance and out-dive performance are summarized in Table 8.

When pool ratings were placed in stepwise regressions with open-water dive behaviors (Feet 01, Time 01, Feet 02,

TABLE 8  
CORRELATION OF POOL SKILLS WITH  
OUT-DIVE BEHAVIOR (1st Study)

	Feet 01	Time 01	Feet 02	Time 02	Order	Dives
Bailout		-.38 <sup>b</sup>			-.43 <sup>c</sup>	
Survival Float	.51 <sup>d</sup>	-.59 <sup>e</sup>			-.45 <sup>c</sup>	
Surface Dives	.45 <sup>c</sup>	-.50 <sup>d</sup>		.29x*		
Deck Entries	.50 <sup>d</sup>	-.57 <sup>e</sup>			-.33 <sup>a</sup>	
Buddy Breathing	.46 <sup>c</sup>	-.54 <sup>e</sup>				
TOTAL	.44 <sup>c</sup>	-.58			-.42 <sup>b</sup>	

NOTE: n = 25 except as noted

\*n = 20

a=p<.10    b=p<.05    c=p<.02    d=p<.01    e=p<.005    f=p<.001

Dive Number), Survival Floating, which had the highest individual correlation, achieved the only significance in multiple regression with Feet 01 ( $r=.51$ ,  $F(1.20)=7.11$ ,  $p<.01$ ) and Time 01  $R=.59$ , ( $F(1.20)=10.80$ ,  $p<.01$ ). No significant regressions emerged with the other out-dive performances in study one.

### Sensation Seeking

In the first study, the Sensation Seeking Scale produced several correlations approaching statistical significance with out-dive performance, but only three in study two that achieved statistical significance (Disinhibition

with feet of second dive; volunteering with the free dive, and Boredom Susceptibility with feet of first dive). These were shown in Table 7.

### Anxiety

In study one, the state Anxiety Scale (ST 02) administered approximately one hour before students entered the water correlated negatively with the depth of the dive, such that as anxiety increased, depth decreased. The State Anxiety Scale (ST 03) administered immediately before entrance into the water produced the same result. The correlation between ST 02 and time spent on the check-out dive had a mild positive relationship. There was a significantly positive correlation between ST 03 and number of dives. Contrary to expectations, three students who made only one dive, had noticeably lower State Anxiety scores than those students making two or more dives, and is summarized in Table 9.

In study one, one of the SERP subscales, the Sensitivity Scale, had a significant negative correlations with the depth on the check-out dive. While Sensitivity had a very strong, positive correlations with the depth of the free dive, and the time of the free dive, assertiveness, tension control, confidence, and self-discipline all correlated negatively with the depth of the free dive. Desire had a significant positive correlation with the time spent down on the free dive. The significant negative correlations

TABLE 9

T-TESTS COMPARING STATE ANXIETY SCORES OF STUDENTS MAKING ONLY ONE DIVE WITH THOSE MAKING TWO OR MORE (Study 1)

	One dive			Two dives or more			<u>df</u>	<u>t</u>	<u>p</u>
	<u>N</u>	<u>M</u>	<u>s</u>	<u>N</u>	<u>M</u>	<u>s</u>			
ST 02	3	28.0	2.0	20	35.45	8.8	21	-1.42	N.S.
ST 03	3	26.33	2.88	19	35.31	7.78	20	-1.94	.10 <sup>a</sup>
ST 04	2	24.00	4.24	16	27.43	6.14	16	- .76	N.S.

a=p<.10   b=p<.05   c=p<.02   d=p<.01   e=p<.005   f=p<.001

between the desire and sensitivity subscales and order of volunteering for the check-out dive.

While order of volunteering for the check-out dive did not relate to behavior on the check-out dive in study one, significant negative correlation did emerge with the time down the depth of the free dive. There was also a noticeable trend for the correlation between order and the total number of dives.

For the total number of dives in study one, and  $R=.77$ ,  $F(3.9)=4.60$ ,  $p<.05$ , with Experience Seeking ( $r=-.52$ ), Order of Free Dive ( $r=.46$ ), and SERP Assertiveness ( $r=-.34$ ) contributing. If all subjects, including those who did not go on the out dive are included in a multiple regression for Number of Dives the obtained  $R=.86$ ,  $F(3.9)=8.62$ ,  $p<.01$ , with Tension Control ( $r=.49$ ), Order for Check-Out Dive ( $r=-.29$ ), and the EPI-LIE Scale ( $r=.14$ ) contributing for study one.

### Masculinity - Feminity - BSRI

For comparisons of subjects by sex role, SCUBA males in the first study ( $N=25$ ,  $M=108.60$ ,  $s=10.64$ ) were significantly higher on the BSRI-Masculinity Scale ( $r(179)=2.27$ ,  $p<.05$ ) than the norm group males ( $N=156$ ,  $M=103.11$ ,  $s=13.06$ ). No comparisons of females on the BSRI-Masculinity Scale proved significant.

In Study 1, comparisons of females on the BSRI-Feminity Scale were not significant. In the first study, self-description of masculinity correlated significantly with several of the pool skills, and were shown in Table 6. There was a trend for those valuing sport for its cathartic value to receive lower pool evaluations, as well as for those describing sport reactions of greater assertiveness and self-discipline.

Again in the first study, as was shown in Table 7, the BSRI-Masculinity Scale also had a significant positive correlation with the depth of the second dive, the free dive, while the Feminity Scale correlated significantly with the time spent down on the free dive.

### Birth Order

In the first study, significant correlation emerged between birth order and personality data; birth order and sociometric ratings; and birth order and dive related behaviors. These results are summarized in Table 5.

Sensation-Seeking declined across birth order. The desire for the social experience of physical activity declined across birth order. There was a trend for anxiety to decline across birth order after the first dive (the check-out dive). While self-ratings of masculinity declined across birth order, self-descriptions in sport related behavior indicates that feelings of assertiveness, confidence, and self-discipline increase across birth order groups. On five of the six sociometric ratings, selection as team leader or partner declined across birth order groups fairly consistently throughout the semester. This seemed to be related to other behavior in that volunteering for the free dive declined across birth orders, and on two of the pool skills ratings declined across birth order. On the open water dive, depth on the free dive declined across birth order groups.

### Study Two

#### Sociometric

In study two when the sociometrics were taken, the larger number of students resulted in complaints by the students that they did not know each other well enough to be able to carry out evaluations. Significant correlations emerged for ratings as a team leader for ATPA-Social ( $r(29) = .49, p < .005$ ), health and fitness ( $r(29) = .30, p < .10$ ), and ascetic ( $r(29) = .34, p < .05$ ). A similar pattern emerged for the ratings as a desired partner, with significant

correlations emerged for ATPA social ( $\underline{r}(19)=.33$   $p<.05$ ), health and fitness ( $\underline{r}(29)$ ,  $p<.10$ ), and Ascetic ( $\underline{r}(29)=.36$ ,  $p<.015$ ).

There were significant correlations between the selection as team leader and the weight an individual can lift ( $\underline{r}(28)=.05$ ,  $p<.005$ ) and between the selection as partner and weight lifted ( $\underline{r}(28)=.61$ ,  $p<.001$ ) in study two.

### Pool Training and Ratings

Due to scheduling problems in the second study on the day of pool ratings, two few experienced raters were available to allow multiple ratings and computation of interrater reliabilities. In the six behaviors rated, of the resulting 15 intercorrelations, eight were significant, suggesting considerable overlap of performance in the rated behaviors. A summary of the rated behaviors and the intercorrelations are shown in Table 10. Personality variables were correlated with pool ratings, and are shown in Table 11 for study two.

To determine if pool behaviors were related to strength or fitness, correlations were computed in the second study, and are shown in Table 12. The ratings on the underwater swim were better for those doing fewer push-ups, while the swim time correlated negatively with the number of push-ups. The fins only circuit had a positive relationship with number of push-ups. There were several relationships with breathing and pulse rates. Significant correlations are shown in Table 13.

TABLE 10  
INTERCORRELATIONS OF POOL RATINGS (2nd Study)

	<u>Swim Time</u>	<u>Snorkel</u>	<u>DON</u>	<u>MF</u>	<u>F</u>
Underwater Swim*a	-26a	+46 (24) <sup>c</sup>	-.04 (27)	+.05 (23)	+.51 <sup>d</sup> (23)
Swim Time**		-.61 (23) <sup>f</sup>	-.13 (27)	-.31 <sup>a</sup> (22)	-.57 <sup>c</sup> (22)
Snorkel-buddy <sup>b</sup>			.16 (22)	.00 (23)	.86 <sup>f</sup> (23)
Don MFS <sup>b</sup>				+.31 <sup>a</sup> (22)	.10 (22)
Circuit-MFS <sup>b</sup>					-.02 (23)

a=p<.10    b=p<.05    c=p<.02    d=p<.01    e=p<.005    f=p<.001

\*only scale where ratings of higher number reflected poorer performance. Sign is reversed for clearer view.

\*\*done in number of seconds.

In the second study, a number of significant correlations emerged between the pool ratings and open-water dive behaviors, and are shown in Table 13. For the check-out (first) dive, time down and the composite group related positively to rated skill on the Don MFS. The relationship for Don MFS increased for the free (second) dive. There was a trend for the buddy breathing task and time to relate positively, while the length of time on the pool swim correlated negatively with time of the free dive. The fins only circuit, however, had a negative relationship with time for the free dive. Although positive relationships were expected between skill and number of dives, such a trend

TABLE 11

## SUMMARY OF CORRELATIONS BETWEEN POOL RATINGS AND PERSONALITY SCALES (2nd Study)

	Underwater* Swim	Swim Time**	Buddy Breathing Snorkel	Don MFS	Circuit- MF	Circuit Fins only
SS-Disin.		-35(28) <sup>b</sup>				
Thrill AS						
Bored		-35(28) <sup>b</sup>			49(23) <sup>d</sup>	
Experience		-33(28) <sup>b</sup>			35(23) <sup>b</sup>	
TOTAL SS		-37(28) <sup>b</sup>			32(23) <sup>a</sup>	
TRAIT		-36(28) <sup>b</sup>				
STATE 01			-28(24) <sup>a</sup>			-38(23) <sup>b</sup>
Locus	+25(29) <sup>a</sup>		37(24) <sup>b</sup>			
ATPA-Social	-28(29) <sup>a</sup>			27(27) <sup>a</sup>	-33(23) <sup>a</sup>	
Health & Fit.						
Vertigo						
Aesthetic			30(24) <sup>a</sup>			
Catharsis			51(24) <sup>e</sup>			
Ascetic		-31(28) <sup>b</sup>				
EPI-Extr.				28(27) <sup>a</sup>		
Neur.			-28(24) <sup>a</sup>			-29(23) <sup>a</sup>
Confidence		-33(28) <sup>b</sup>	36(24) <sup>b</sup>			31(23) <sup>a</sup>
Concern		35(28) <sup>b</sup>	-53(24) <sup>e</sup>			-39(23) <sup>b</sup>
Conformity		27(28) <sup>a</sup>				
Compt.-Anx.		-44(28) <sup>d</sup>	38(24) <sup>b</sup>			36(23) <sup>b</sup>
Lead Team		-39(28) <sup>c</sup>	28(24) <sup>a</sup>			

a =  $p < .10$     b =  $p < .05$     c =  $p < .02$     d =  $p < .01$     e =  $p < .005$     f =  $p < .001$

\*only scale where ratings of higher number reflected poorer performance. Sign is reversed for clearer view.

\*\*done in number of seconds.

TABLE 12

SUMMARY OF INTERCORRELATIONS BETWEEN POOL AND STRENGTH FITNESS MEASURES (2nd Study)

	BR01	PULSE01	BR02	PULSE02	BR03	PULSE03	BR04	PULSE04	PUSH	SIT	WEIGHT
Underwater* Swim									43 <sup>c</sup> (27)		
Swim** Time		-43 <sup>c</sup> (26)	-43 <sup>c</sup> (24)	-31 <sup>a</sup> (26)				-35 <sup>b</sup> (26)	+30 <sup>a</sup> (26)		
Buddy Breath		-46 <sup>c</sup> (23)	-46 <sup>c</sup> (22)	-39 <sup>b</sup> (26)				-58 <sup>e</sup> (23)			30 <sup>a</sup> (23)
Don MFS CIRCUIT MF											
CIRCUIT F		-33 <sup>a</sup> (22)	-54 <sup>c</sup> (21)						40 <sup>b</sup> (22)		

a =  $p < .10$ b =  $p < .05$ c =  $p < .02$ d =  $p < .01$ e =  $p < .005$ f =  $p < .001$ 

\*Expressed in terms of number of seconds to complete.

\*\*Originally rated such that lower ratings meant better performance. Sign reverse for consistency with other ratings.

TABLE 13  
SUMMARY OF SIGNIFICANT CORRELATIONS BETWEEN POOL RATINGS AND OPEN  
WATER DIVE BEHAVIORS (2nd Study)

	Feet 01	Time 01	Group 01	Feet 02	Time 02	Group 02	Dives	Pre-Dive STAI	Post Dive STAI
Underwater*									
Swim									
Swim**					-48 <sup>d</sup>			-58 <sup>f</sup>	
Time					(23)			(24)	
Buddy					31 <sup>a</sup>		30 <sup>a</sup>		
Breathing					(22)		(24)		
DON	28 <sup>a</sup>	32 <sup>b</sup>	45 <sup>d</sup>	44 <sup>c</sup>	43 <sup>b</sup>	-42 <sup>c</sup>			37 <sup>b</sup>
MFS	(25)	(25)	(25)	(22)	(20)	(25)			(21)
Circuit									
MFS									
Circuit					-46 <sup>c</sup>			-46 <sup>c</sup>	
F					(21)			(23)	

a =  $p < .10$       b =  $p < .05$       c =  $p < .02$       d =  $p < .01$       e =  $p < .005$       f =  $p < .001$

\*Expressed in terms of number of seconds to complete

\*\*Originally rated such that lower ratings meant better performance. Sign reverse for consistency with other ratings.

developed for buddy breathing, but an inverse relationship emerged for Don MFS. While pre- and post-dive anxiety would be expected to decrease with skill, it was found that swim time correlated negatively. While the fins-only circuit had an inverse relationship to pre-dive anxiety, Don MFS had a direct relationship to post-dive anxiety.

In study two, four pool skills, Don MFS ( $r=.28$ ), Underwater Swim ( $r=.16$ ) Buddy Breathing with snorkel ( $r=.17$ ), and Circuit/fins only ( $r=.11$ ) with the depth of the check-out dive, yield a multiple  $R=.62$ ,  $F(4.17)=2.69$ ,  $p<.10$  in study two. No significant relationship emerged for the time length of the check-out dive. For the depth of the free dive, 440 yard swim time ( $r=-.48$ ) and Don MFS ( $r=.44$ ) produced a multiple  $R=.61$ ,  $F(2.18)=5.46$ ,  $p<.05$ , with Don MFS ( $r=-.42$ ) and Buddy Breathing ( $r=.30$ ) contributing.

### Sensation Seeking

In the second study, the personality measures showed some expected, and some unexpected relationships to open-water dive behaviors, and are shown in Table 14. Various sensation-seeking subscales, and the total scale score, showed positive relationship to the depth of dive on the first and second dive, but inverse relationships with the time of the free (second) dive. Boredom susceptibility had an inverse relationship with the number of dives.

TABLE 14  
SUMMARY OF INTERCORRELATIONS OF PERSONALITY  
AND OUT-DIVE DATA (2nd Study)

	Feet 01	Time 01	Group 01	Feet 02	Time 02	Group 02	Dives	ST 02	ST 03
	47 <sup>d</sup> (27)			36 <sup>b</sup> (24)					
Bored					-37 <sup>b</sup> (24)		-36 <sup>b</sup> (27)		
Thrill AS						35 <sup>a</sup> (21)			
Experience	43 <sup>c</sup> (27)			50 <sup>d</sup> (24)	-33 <sup>a</sup> (24)				
Total	32 <sup>b</sup> (27)			36 <sup>b</sup> (24)	-30 <sup>a</sup> (24)				
Fight	32 <sup>b</sup> (27)								
TRAIT		51 <sup>e</sup> (27)	33 <sup>b</sup> (27)	59 <sup>f</sup> (24)	-28 <sup>a</sup> (24)				
ST01				30 <sup>a</sup> (24)		44 <sup>b</sup> (21)	-33 <sup>b</sup> (27)	26 <sup>a</sup> (27)	
LOC	37 <sup>b</sup> (27)	33 <sup>b</sup> (27)							
ATPA Social				31 <sup>a</sup> (24)		34 <sup>a</sup> (21)		32 <sup>b</sup> (27)	

TABLE 14--Continued

	Feet 01	Time 01	Group 01	Feet 02	Time 02	Group 02	Dives	ST 02	ST 03
Health & Fitness						31 <sup>a</sup> (21)			
Aesthetic				67 <sup>f</sup> (24)		52 <sup>d</sup> (21)		-28 <sup>a</sup> (23)	
Cat				27 <sup>a</sup> (24)					
AG03									
EXT	44 <sup>d</sup> (27)				37 <sup>b</sup> (24)		-26 (27)		
Neuroticism						35 <sup>a</sup> (21)			
LIE									
Risk						30 <sup>a</sup> (21)			
Confidence							29 <sup>a</sup> (27)		
Leadership							-26 <sup>a</sup> (27)		
Conformity							41 <sup>c</sup> (27)		
Masculinity	37 <sup>b</sup> (27)								

TABLE 14--Continued

	Feet 01	Time 01	Group 01	Feet 02	Time 02	Group 02	Dives	ST 02	ST 03
Femininity									
Leadership									
Team									
Ill. Comp.				54 <sup>e</sup> (24)		34 <sup>a</sup> (21)	-42 <sup>c</sup> (27)		
Pre-Dive ST 02	-29 <sup>a</sup> (27)				38 <sup>b</sup> (24)		-60 <sup>f</sup> (23)		
Post-Dive ST 03									
a= <u>p</u> <.10	b= <u>p</u> <.05	c= <u>p</u> <.02	d= <u>p</u> <.01	e= <u>p</u> <.005	f= <u>p</u> <.001				

### Anxiety

In the second study State Anxiety had an inverse relationship with the number of dives. More trait-anxious subjects tended to spend more time underwater on the check-out dive, and to dive to greater depth on the free dive.

In the second study, the pre-dive State Anxiety measure was significantly related negatively with depth of check-out dive, but a positive relationship with the time length of the free dive. The pre-dive measure had an inverse relationship with the number of dives made, and the post-dive state anxiety measure had an even such stronger relationship.

In study two as locus of control became more external, both depth and time length of the check-out dive increased. The ATPA produced only two significant relationships, with a mildly positive relationship between Social Attitudes and depth of the second dive, and a very strong positive relationship between Aesthetic Attitudes and the second dive depth. More extraverted individuals tended to dive more deeply on the first dive, but to stay down longer on the second dive.

The only significant relationships between dive behavior and the Training Concerns scale indicated positive relationships between the conformity scale between the depth of the free dive and the number of dives. Competition anxiety shows strong positive relationship with the depth of the second dive.

In study two for the depth of the check-out dive, a multiple  $R=.56$ ,  $F(2.16)=3.83$ ,  $p<.05$  emerged with Disinhibition ( $r=.47$ ) and Locus of Control ( $r=.37$ ) contributing. Three scales contributed to a multiple  $R=.72$ ,  $F(93.15)=5.42$ ,  $p<.01$ , Trait Anxiety ( $r=.51$ ), initial State Anxiety ( $r=.04$ ) and BSRI-Mas ( $r=.37$ ) for the time of the check-out dive.

For the depth of the second dive in study two, a highly significant multiple  $R=.90$ ,  $F(3.15)=22.39$ ,  $p<.01$  emerged, with ATPA Aesthetic ( $r=.67$ ), Trait Anxiety ( $r=.59$ ), and Experiences Seeking ( $r=.50$ ) contributing. Pre-dive state anxiety ( $r=.38$ ), Boredom susceptibility ( $r=.37$ ), and CPI Extraversion ( $r=.37$ ) contributed to a multiple  $R=.70$ ,  $F(3.15)=4.48$ ,  $p<.025$  for the time of the check-out dive free dive.

When the number of dives made in study two was examined, a multiple  $R=.74$ ,  $F(3.15)=6.29$ ,  $p<.01$  was obtained. Post-dive anxiety ( $r=.60$ ), conformity ( $r=.41$ ), and pre-dive state anxiety ( $r=.42$ ) contributed.

#### Masculinity - Femininity - BSRI

In the second study, the SCUBA males ( $N=30$ ,  $M=111.56$ ,  $s=9.29$ ) were significantly higher on the BSRI-Masculinity Scale ( $t(184)=4.19$ ,  $p<.001$ ) than the norm group males ( $N=156$ ,  $M=103.11$ ,  $s=13.06$ ).

When SCUBA males in both studies were compared to norm group males on the BSRI-Femininity Scale, no comparisons proved significant. In Study 2, the comparison of

the SCUBA females ( $N=1$ ,  $M=97.90$ ,  $s=7.23$ ) were significantly lower ( $t(192)=2.13$ ,  $p<.05$ ) on this scale than norm group females ( $N=184$ ,  $M=103.32$ ,  $s=11.27$ ).

### Birth Order

In the second study, significant positive correlations emerged between birth order and several personality scales; sensation seeking (Disinhibition, Thrill AS, and total score); initial state anxiety; physical activity attitudes for health and fitness, and vertigo; increasing across birth order. Extraversion and neuroticism also increased across birth order, while the LIE Scale, indicative tendency toward socially-desirable responses, decreased. A scale reflecting conformity decreased across birth orders.

There was a trend for ratings of preference as team leader to decrease across birth orders. On the fitness measures, pulse immediately after physical stress, and breathing following five minutes of rest decreased across birth order. The correlations are shown in Table 3.

### Strength and Behavior

High risk adventure activities are commonly linked or associated with the "Macho" image. Because of this aspect, it was also explored to determine correlations of strength, performance, and behavior in basic divers.

Although only students going on the open-water can be certified, two dives are required. Three males in the

second study did not go on the open-water dive; three males who went on the dive made only one dive in study two. The data for these two groups were combined, and the results for the certified males were compared to the non-certified males on personality, scales, pool ratings, strength, and fitness measuring. The significant differences are shown in Table 15.

TABLE 15  
SUMMARIES OF COMPARISONS OF CERTIFIED AND  
NON-CERTIFIED MALE STUDENTS (Study 2)

Measure	<u>Non-Certified</u>			<u>Certified</u>			<u>t</u>
	<u>N</u>	<u>M</u>	<u>S</u>	<u>N</u>	<u>M</u>	<u>S</u>	
Trait Anxiety	6	35.00	9.42	24	26.79	7.31	2.32 <sup>b</sup>
1 State Anxiety	6	33.66	8.71	24	29.08	4.80	1.76 <sup>a</sup>
Weight Lifted	4	122.50	18.93	24	172.70	47.20	2.07 <sup>b</sup>
Leader	6	4.33	3.93	24	13.77	7.90	2.69 <sup>c</sup>
Team Partner	6	4.50	5.01	24	13.70	6.78	3.10 <sup>e</sup>

a= $\underline{p}$ <.10    b= $\underline{p}$ <.05    c= $\underline{p}$ <.02    e= $\underline{p}$ <.005

NOTE: ALL  $\underline{df}$  = 28, except for weight lifted, where  $\underline{df}$  = 26.

In the second study, of the significant correlations of open-water behaviors and strength measures, the number of sit-ups correlated negatively with depth of the free dive ( $\underline{r}(24)=-.44$ ,  $\underline{p}<.02$ ), second dive group ( $\underline{r}(25)=.36$ ,  $\underline{p}<.05$ ), but positively number of dives ( $\underline{r}(25)=.35$ ,  $\underline{p}<.05$ ). Amount of weight lifted showed a trend in its relationship to the time length of the check-out dive ( $\underline{r}(24)=.29$ ,  $\underline{p}<.10$ ).

Push-ups had no significant relationship to open-water dive behaviors.

There were a number of generally negative correlations between breath and pulse measures and open-water dive behaviors. These were summarized in Table 6 for study two.

In study two, no variable added significantly to the simple correlations ( $r=.57$ ) between pulse 02 and depth of the check-out dive. For the time length of the check-out dive, Pulse 04 ( $r=-.40$ ) and weight lifted ( $r=-.28$ ) contribute to a multiple  $R=.53$ ,  $F(2.20)=3.95$ ,  $p<.05$ . For the depth of the free dive, sit-ups ( $r=.44$ ), Breath 02 ( $r=-.37$ ),  $p<.01$ , Table 16. The generally low simple correlations between these variables and time of the free dive did not combine to produce a significant multiple regression.

When the total number of dives made was considered, a multiple  $R=.63$ , emerged,  $F(4.18)=3.08$ ,  $p<.05$ , with four variables, sit-ups ( $r=.35$ ), pulse 01 ( $r=.26$ ), Pulse 04 ( $r=-.04$ ), and Breath 02 ( $r=-.27$ ) contributing.

#### Out-Dive Underwater Evaluation

In order to assess the quality of the students' performance underwater, a 42 item questionnaire was constructed (see Appendix F) which asked the instructor taking the student on the check-out dive for a performance rating at key stages. The items for the questionnaire were devised by two expert instructors, familiar with the underwater area used and the skills tested. The questionnaire filled out by

TABLE 16

SUMMARY OF INTERCORRELATIONS OF BREATH AND PULSE MEASURES WITH  
OPEN-WATER DIVE BEHAVIORS (2nd Study)

	Feet 01	Time 01	Group 01	Feet 02	Time 02	Dives 02	Total Dives	Pre-Dive Anz.	Post-Dive Anz.
BR01		28 <sup>a</sup> (24)						36 <sup>b</sup> (25)	
PULSE01		31 <sup>a</sup> (25)	-29 <sup>a</sup> (25)						
BR02				-37 <sup>b</sup> (22)	28 <sup>a</sup> (24)			32 <sup>a</sup> (23)	
PULSE02	-57 <sup>f</sup> (25)		-40 <sup>b</sup> (25)					35 <sup>b</sup> (25)	
BR03									
PULSE03	-39 <sup>b</sup> (25)		-35 <sup>b</sup> (25)						
BR04									
PULSE04	-32 <sup>a</sup> (25)	-40 <sup>b</sup> (25)	-46 <sup>d</sup> (25)						
a = $p < .10$ b = $p < .05$ c = $p < .02$ d = $p < .01$ e = $p < .005$ f = $p < .001$									

each instructor after each student's check-out dive was large and bulky, and to be useful, needed shortening. A grouping of the items was also necessary for data analysis.

The 42 check-out dive behaviors rated were subjected to a principle component factor analysis which is a generally prescribed first step in the development of a research instrument.<sup>1</sup> On the resulting analysis, the first factor (general performance) accounted for 34% of the variance, and the remaining factors for considerably less.

Using Catell's "screen test," only one factor was rotated. In a second analysis, therefore, the 16 items loading above .70 on the first unrotated factor were subjected to orthogonal and oblique rotations. Due to the small number of subjects, the relatively large number of items, and the exploratory nature of the analysis, this highly conservative analysis was used.

Five factors with eigenvalues greater than one, emerged on the oblique and orthogonal rotations, both of which were highly similar. The oblique rotation was accepted as it was assumed the factors were not independent.<sup>2</sup> The items and their factor loadings are shown in Table 17.

The results of these factors were related to the other variables. If the scale or factor was to be considered

---

<sup>1</sup>A.L. Comrey, A First Course in Factor Analysis, (New York: Academic Press, 1973).

<sup>2</sup>J.C. Nunnally, Psychometric Theory, Second Edition, (New York: McGraw Hill, 1978).

TABLE 17  
SUMMARY OF ITEMS AND FACTOR LOADING  
FOR OPEN-WATER RATINGS

Loading	Item
<u>Factor 1: General Performance</u>	
.88	D) At the tin whistle, how much of a problem did the student having in equalizing ear pressure?
.86	7) How would you rate the student's ability at equalizing ear pressure at the tin whistle?
.79	14) After the student exited the tin whistle, did you notice. . . (unusually wide eyes)?
.77	15) After the student exited the tin whistle, did you notice. . . (looking towards surface)?
.73	21) At the submerged car, how curious was the person? (cumulative proportion of variance 44%)
<u>Factor 2: Surfacing Behavior</u>	
.98	28) During the ascent, did the student automatically look up?
.98	29) During the ascent, did the student automatically reach up?
.98	30) During the ascent, did the student automatically come up? (cumulative proportion of variance = 62%)
<u>Factor 3: Surfacing Emotions</u>	
.90	33) Did the person look anxious when you surfaced?
.78	41) How much did the student seem to enjoy the dive?
.72	42) How anxious or tense did the student look when you surfaced? (cumulative proportion of variance = 71%)
<u>Factor 4: Positive Reactions</u>	
.76	35) Did the person look happy with the trip when you surfaced?
.81	36) Did the person look as though they were ready to go again after you surfaced?
.74	37) Was the person very talkative when you surfaced? (cumulative proportion of variance = 79%)

TABLE 17--Continued

Loading	Item
	<u>Factor 5: Exploratory Behavior</u>
.91	22) At the submerged car, did the person follow you or take time and look around?
.71	24) How freely did the person explore the car? (cumulative proportion of variance = 84%)

valid, it should relate to other open-water dive behaviors. Factor 04 (positive reactions) correlated .32 ( $\underline{n}=23$ ,  $\underline{p}<.07$ ) with post-dive state anxiety. One significant correlation emerged between the time of the first dive and Factor 03 (surfacing emotions) ( $\underline{r}=-.59$ ,  $\underline{n}=27$ ,  $\underline{p}<.001$ ), and one trend emerged, for Factor 04 (positive reactions) ( $\underline{r}=-.28$ ,  $\underline{n}=27$ ,  $\underline{p}<.08$ ). The depth of the second dive correlated significantly with Factor 03 (surfacing emotions) ( $\underline{r}=-.47$ ,  $\underline{n}=24$ ,  $\underline{p}<.02$ ), and moderately with Factor 04 (positive reactions) ( $\underline{r}=-.31$ ,  $\underline{n}=24$ ,  $\underline{p}<.07$ ). Factor 07 correlated significantly with the free dive time length ( $\underline{r}=.39$ ,  $\underline{n}=24$ ,  $\underline{p}<.05$ ). Two trends emerged for this time behavior, with Factor 04 (positive reactions) ( $\underline{r}=.27$ ,  $\underline{n}=24$ ,  $\underline{p}<.10$ ) and Factor 03 ( $\underline{r}=.28$ ,  $\underline{n}=24$ ,  $\underline{p}<.10$ ).

When related to pool skills, Factor 01 showed a mild relationship to circuit Fins only ( $\underline{r}(23)=-.28$ ,  $\underline{p}<.10$ ). Factor 05 (exploratory behavior) showed two significant relationships, with Underwater Swim ( $\underline{r}(27)=-.39$ ,  $\underline{p}<.05$ ), with Buddy Breathing ( $\underline{r}(24)=.37$ ,  $\underline{p}<.05$ ). Factor 01 (general

performance) correlated with underwater swim ( $r(27)=.37$ ,  $p<.05$ ), and showed a mild relationship to buddy breathing ( $r(24)=-.27$ ,  $p<.10$ ). Factor 04 (positive reactions) related to buddy breathing ( $r(24)=-.33$ ,  $p<.05$ ) and circuit/fins ( $r(23)=-.31$ ,  $p<.07$ ).

When related to the strength and fitness measures, Factor 05 (exploratory behaviors related both to sit-ups ( $r(25)=.32$ ,  $p<.05$ ) and push-ups ( $r(25)=.35$ ,  $p<.05$ )). No other significant relationships existed between the strength measures and the out-dive questionnaire in study two. A number of significant relationships emerged between the breath and pulse measures and underwater ratings, and are shown in Table 18. Table 19 contains a summary of the significant correlations between the underwater ratings and the personality scales.

For the depth of the check-out dive, the time of the free dive and the total number of dives in study two, no significant multiple correlations emerged. For the time length of the check-out dive, surfacing anxiety ( $r=-.59$ ) and surfacing behavior ( $r=.13$ ) produced a highly significant multiple  $R=.74$ ,  $F(2.24)=14.56$ ,  $p<.01$ . For the depth of the free dive, surfacing anxiety ( $r=-.47$ ) and surfacing behavior ( $r=.22$ ) produced a multiple  $R=.67$ ,  $F(2.21)=8.55$ ,  $p<.01$ .

TABLE 18  
SUMMARY OF CORRELATIONS BETWEEN FITNESS  
MEASURES AND UNDERWATER RATINGS

	1*	2*	3*	4	5
BR01	.34 <sup>b</sup> (25)	.27 <sup>a</sup> (25)		-.30 <sup>a</sup> (25)	.28 <sup>a</sup> (25)
PULSE 01				-.27 <sup>a</sup> (25)	-.31 <sup>a</sup> (25)
BR02	.32 <sup>a</sup> (23)				
PULSE 02			.45 <sup>c</sup> (25)	-.25 <sup>a</sup> (25)	
BR03				-.35 <sup>b</sup> (23)	.42 <sup>b</sup> (23)
PULSE 03			.38 <sup>b</sup> (25)	-.37 <sup>b</sup> (25)	-.44 <sup>c</sup> (25)
BR04					
PULSE 04			.32 <sup>a</sup> (25)	-.29 <sup>a</sup> (25)	-.41 <sup>c</sup> (25)

a=p<.10    b=p<.05    c=p<.02    d=p<.01    e=p<.005    f=p<.001

\*Scored such that higher scores mean poorer performance.

Comparison of Data for Three Semesters  
(Pilot Study, Study 1, and Study 2)

When the data were compared on all personality scales and open water dive behaviors during the semesters, no significant differences emerged for most of the personality scales. As is shown in Table 20, however, the males in Study 2 reported significantly less Trait Anxiety. Pilot study students reported lower initial State Anxiety than Study 1 students. While the pilot study and Study 1 students were significantly more external than both. Significant

TABLE 19

## SUMMARY OF CORRELATIONS BETWEEN UNDERWATER RATINGS AND PERSONALITY SCALES

	Anx Sympt	Surfacing Behavior	Surf. Anx.	Surface Appear	Exploration
SS 01 Disin.					
SS 02 Bored			-41 <sup>c</sup> (27)		-33 <sup>b</sup> (27)
SS 03 Thrill AS		+31 <sup>b</sup> (27)			
SS 04 Experience			-33 <sup>b</sup> (27)	+29 <sup>a</sup> (27)	-25 <sup>a</sup> (27)
SS 05 Total			-32 <sup>b</sup> (27)		-28 <sup>a</sup> (27)
Birth Trait	-31 <sup>a</sup> (27)	-31 <sup>b</sup> (27)	-55 <sup>f</sup> (27)	+36 <sup>b</sup> (27)	-26 <sup>a</sup> (27)
State		-38 <sup>b</sup> (27)			
Locus			-41 <sup>c</sup> (27)		-28 <sup>a</sup> (27)
ATPA Social Health		-27 <sup>a</sup> (27)			

TABLE 19--Continued

	Anx Sympt	Surfacing Behavior	Surf. Anx.	Surface Appear	Exploration
Vertigo					
Aesthetic				+31 <sup>b</sup> (27)	
Catharsis					45 <sup>b</sup> (27)
Ascetic					
Ext					36 <sup>b</sup> (27)
Neur		-37 <sup>a</sup> (27)			
Lie	42 (23)			-39 <sup>b</sup> (23)	39 <sup>b</sup> (23)
ATT-Risk					28 <sup>a</sup> (27)
Confidence					29 <sup>a</sup> (27)
Concern					
Leadership		+48 <sup>c</sup> (27)	-41 <sup>c</sup> (27)		
Conformity					
Sport Anx.					

TABLE 19--Continued

	Anx Sympt	Surfacing Behavior	Surf. Anx.	Surface Appear	Exploration
Masculinity			-29 <sup>a</sup> (27)		44 <sup>d</sup> (27)
Femininity					28 <sup>a</sup> (27)
Leadership			25 <sup>a</sup> (27)		28 <sup>a</sup> (27)
Team	28 <sup>a</sup> (27)		27 <sup>a</sup> (27)	+30 <sup>a</sup> (27)	24 <sup>a</sup> (27)

a =  $\underline{p} < .10$     b =  $\underline{p} < .05$     c =  $\underline{p} < .02$     d =  $\underline{p} < .01$     e =  $\underline{p} < .01$     f =  $\underline{p} < .001$

NOTE: Same as previous

TABLE 20

## SUMMARY OF SIGNIFICANT MEAN COMPARISONS FOR THREE SEMESTERS

	<u>Pilot Study</u> <u>Semester 1</u>			<u>Study 1</u> <u>Semester 2</u>			<u>Study 2</u> <u>Semester 3</u>		
	<u>N</u>	<u>M</u>	<u>S</u>	<u>N</u>	<u>M</u>	<u>S</u>	<u>N</u>	<u>M</u>	<u>S</u>
Trait	28	35.2	17.76	29	36.10	10.47	30	28.43	8.30
Initial St.	28	38.89	10.17	22	49.18	9.18	30	30.00	5.90
Locus	29	8.51	4.00	29	7.41	3.41	30	10.40	4.85
Pre-Dive St.				23	34.02	7.91	27	37.11	7.31
Feet 01				22	38.40	7.30	27	56.85	7.48
Time 01				22	16.63	11.91	27	12.22	2.77
Feet 02	28	41.75	11.64	20	52.75	20.55	24	43.12	12.51
Time 02	24	25.83	7.17	20	18.22	8.24	24	22.85	6.99
	Com. SEMESTERS					<u>DF</u>	<u>t</u>	<u>p</u>	
trait anxiety	1 - 3					56	3.15	.01	
"	2 - 3					57	3.09	.01	
initial state anxiety	1 - 3					56	3.97	.001	
"	2 - 3					50	8.40	.001	
"	1 - 2					48	3.62	.001	
Locus	1 - 3					57	1.60	n.s.	
"	2 - 3					57	2.70	.01	
Pre-Dive Stat.	2 - 3					48	1.36	n.s.	
Feet 01	2 - 3					43	9.52	.001	
Time 01	2 - 3					43	1.66	n.s.	
Feet 02	1 - 2					42	2.10	.05	

TABLE 20--Continued

	Com. SEMESTERS	DF	t	p
Feet 02	2 - 3	42	1.78	.10
"	1 - 2	42	3.20	.01
Time 02	2 - 3	42	2.04	.05

differences in the depth of the check-out dive emerged between Study 2, and Study 1 students, but the mean depth for both was very close to the depth at which the procedure line was set (study 2=60 feet; study 1=45 feet). On the free dive, however, Study 2 students went significantly less deep than Study 1 students. In the free dive, however, the Study 1 students stayed down significantly less time than the pilot study Study 2 students.

Although the tests utilized for these comparisons are described as highly robust, and able to tolerate non-homogeneity of variances, comparisons for the check-out dive time and free dive time involved considerable differences in variances.<sup>1</sup> A more conservative estimate of  $t$  was computed for each of these utilizing the Cochran and Cox method described by Ferguson.<sup>2</sup> Using this test, the comparison between the differences in time of the check-out dive (Time 10) for study one and study two remained significant ( $t=2.08$ ,  $df=30.45$ ,  $p<.05$ ). Comparisons between the depth of the free dive (Feet 02) remains significant in comparisons of data for the pilot data and study one ( $r=2.09$ ,  $df=35.30$ ,  $p<.05$ ), and study one and study two ( $t=2.09$ ,  $df=38.58$ ,  $p<.05$ ).

---

<sup>1</sup>B.J. Winn, Statistical Principles, 1971; W.J. Dixon and M.B. Brown, BMDP-Biomedical Computer Programs, P-Series, 1979 (Berkeley: University of California Press, 1979).

<sup>2</sup>G.A. Ferguson, Statistical Analysis in Psychology and Education, (New York: McGraw Hill, 1966).

## CHAPTER V

### SUMMARY, FINDINGS AND CONCLUSIONS IMPLICATIONS AND INFERENCES

#### Summary

The purpose of this study was to identify behavioral needs fulfilled by administrative inclusion of risk oriented activities. One such high risk sport, SCUBA Diving, was used as a basis from which a program model for other high risk sports could be developed. The methodology for development of this model was based on the ability to identify psychological and physical traits and to predict performance from these behavioral characteristics.

Data from two different classes of basic SCUBA students were analyzed separately as Study One and Study Two. There were twenty-nine males and seven females in the first study; and, there were thirty males and ten females in the second. Both populations were made up of college men and women ranging from eighteen to thirty-six years of age.

Both classes met one night each week for sixteen weeks during the regular semester for two hours each night. At the end of each class, the entire group was eligible to

participate on the open water dive held at Possum Kingdom Lake. Upon successful completion of the final examination and the open water training, the student received a basic diving card through the YMCA Underwater Activities Center.

During each class, students filled out evaluative instruments and participated in both classroom and water work activities.

### Findings

The research effort was directed to identifying psychological traits and to predicting performance from these traits based upon the written tests used to measure the traits. It also involved identification of behavioral needs fulfilled by the administrative inclusion of risk oriented activities.

Some specific questions to which the study was directed were:

1. What psychological traits exist in high risk activity participants which may be predictive of success?
2. Of what importance is birth order regarding risk sports?
3. Is there a reason for the difference in performance between males and females?
4. Does early performance in training indicate later success in risk activities?
5. Should administrators of public agencies such as schools, colleges, and universities sponsor risk oriented recreation like SCUBA and others?
6. Is administration of risk recreation too costly considering liability, safety implications, and the hiring of qualified individuals for instruction?

In order to answer these proposed questions, five null hypotheses were developed.

Ho<sub>1</sub> stated: There is no significant difference between participants in risk oriented courses and normative population samples in measures of anxiety. The hypothesis was rejected at the .005 level of significance.

Ho<sub>2</sub> stated: There is no significant difference between high risk activity participation and the general population with regard to sensation seeking. The hypothesis was not rejected.

Ho<sub>3</sub> stated: There is no significant difference between high risk activity participants and the general population in the locus of control. The hypothesis was not rejected.

Ho<sub>4</sub> stated: There is no significant difference between male and female participants in high risk activities in regard to personality traits or performance. The hypothesis was rejected at the .05 level of significance.

Ho<sub>5</sub> stated: There is no significant difference between birth order groups in performance or success in high risk sports. The hypothesis was not rejected.

### Conclusions

Within limitations of the study, the following conclusions were supported:

1. College students enrolling in High Risk sports are significantly less anxious than the general population.

2. College students enrolling in High Risk sports are not significantly higher in sensation-seeking than the general college population.

3. Earlier born participants in High Risk sports do better with training

4. Males are leaders, males in strength, proportion

5. P. cantly d.

6. risk acti

7. Ad colleges, oriented rec

8. Adminis. considering liabilities hiring of qualified individuals

9. Administrators should hire risk activity instructors that have a background in professional education, physical education, recreation, and certification in the specific risk area.

#### Recommendations

The findings, conclusions, and additional material presented in both studies support the following recommendations:

2. College students enrolling in High Risk sports are not significantly higher in sensation-seeking than the general college population.

3. Earlier born participants in High Risk sports do better with training tasks.

4. Males are more likely to be selected as dive leaders, males have higher pool ratings, males do better in strength-related tasks, more males take the course, and proportionally more males finish the course.

5. Participants in high risk sports do not significantly differ among themselves in Locus of Control.

6. Early performance does indicate later success in risk activities.

7. Administrators of public agencies such as schools, colleges, and universities should include and sponsor risk oriented recreation like SCUBA and others.

8. Administration of risk recreation is not too costly considering liability, safety implications, and the hiring of qualified individuals for instruction.

9. Administrators should hire risk activity instructors that have a background in professional education, physical education, recreation, and certification in the specific risk area.

#### Recommendations

The findings, conclusions, and additional material presented in both studies support the following recommendations:

1. Additional research with larger pools of female participants should be undertaken to determine and validate findings suggested by this study.

2. Until such research can be done, the High Risk Instructor would need to be aware of the possible importance of typically male attributes such as physical strength being a factor in many high risk endeavors.

3. Women involving themselves in high risk sports should be prepared to experience greater difficulty in skill tasks.

4. Administrators of high risk programs should be aware of the need for differences in programming and instruction for women.

5. If possible, rather than training with males, females might be given time with other women students, with female instructors, and assistants as models and guides. This particular aspect is important in administrative considerations for hiring instructors.

6. The reduction of anxiety should be emphasized throughout the high risk course by increasing training confidence, by increasing competence through practical training prior to final exposure to the high risk sport, and by providing students with information on psychological set so as to better understand their own feelings.

7. Students with higher anxiety should be identified and given additional help in training and in understanding their own feelings.

8. High risk adventure students should develop relaxation techniques, systematic desensitization programs, or cognitive restructuring for better coping abilities.

9. Administrators should encourage instructors to spend more time helping students develop positive, realistic expectations in regard to adventure activities.

10. Instructors should be aware of the value of peer evaluations which may supply information about training performance that the adventure instructor may not have become aware of in any systematic way until specific task assessments are done.

11. The persistency of a student's volunteering, or "hanging back" may be an important non-verbal statement about ability, confidence, and self-assessment to the instructor.

12. The instructor should be aware of the variables involved, be able to identify those which may cause problems, and be able to employ necessary psychological, and education methodology for resolving each problem as it is faced by the student.

## BIBLIOGRAPHY

### Books

- Campbell, D.T. and Stanley, J.C. Experimental and Quasiexperimental Designs for Research on Teaching. In N.L. Gage (Ed.) "Handbook of Research on Teaching." Chicago: Rand McNally, 1963, pp. 171-246.
- Cattell, R.B. and Scheir, I.H. Handbook for the IPAI Anxiety Scale (Second Edition). Champaign, Illinois: Institute for Personality and Ability Testing, 1963.
- Chambers, Randall M., and Fried, Robert. Physiology of Man in Space, Psychological Aspects of Space Flight. New York: Academic Press Inc., 1963, pp. 246-7.
- Comrey, A.L. A First Course in Factor Analysis, New York: Academic Press, 1973.
- Eysenck, H.J. and Eysenck, S.B.G. Personality Structure and Measurement. San Diego: Robert R. Knapp, pp. 154-217.
- Ferguson, G.A. Statistical Analysis in Psychology and Education. New York: McGraw-Hill, 1966.
- Kraus, R.G. and Curtis, J.E. Creative Administration in Recreation and Parks, St. Louis: C.V. Mosby Company, 1971, p. 1.
- Moslow, A. Toward A Psychology of Being. Second Edition. Princeton, New Jersey: D. Van Nostrand Company, Inc., 1968, pp. 123-104-114.
- Nunnally, J.O. Psychometric Theory. New York: McGraw-Hill, 1967.
- Phares, J.E. Locus of Control in Personality. Morristown: General Learning Press, 1976.
- Radloff, R. and Helmreich, R. Groups Under Stress. New York: Appleton Century-Crofts, 1968.

Rousseau, J.J. "A Discourse on the Origin of Inequality".  
Trans. G.D.H. Cole, Great Books of the Western  
World, Vol. 38. (Chicago: Encyclopedia Britannica,  
1952), p. 352.

Speilberger, C.D.; Gorsch, R.L.; and Lushene, R.E. The  
State Trait Anxiety Inventory. Preliminary test  
manual for Forms, Tallahassee, Florida: Florida  
State University, 1968.

Tutko, Thomas, Ph.D. Sports Psyching. Los Angeles: J.P.  
Tarcher, Inc., 1976, pp. 5-45-50.

University of Oklahoma Computer Center Operation Manual, The.

Webb, E.J. Unobtrusive Measures. Chicago: Rand McNally  
and Company, 1970., 1-34.

Winn, B.J. Statistical Principles. 1971; W.J. Dixon and  
M.B. Brown, BMDP-Biomedical Computer Programs, P-  
Series, 1979. Berkeley: University of California  
Press, 1979.

Winer, B.J. Statistical Principles in Experimental Design.  
Second Edition (New York: McGraw Hill, 1971

Worth, Morgan. Eye Color, Sex, and Race. Anderson: Droke  
House/Hallux, 1974, p. 11.

Wright, R.L.D. Understanding Statistics. New York:  
Harcourt Brace Jovanovich, Inc., 1976, pp. 378-9.

#### Periodicals

Baker, F.B. "Univac Scientific Computer Program for Scaling  
of Psychological Inventories by the Method of  
Reciprocal Averages." Behavioral Science 5:268-69,  
1960.

Berkowitz, W.R. "Use of the Sensation-Seeking Scale with  
Thai Subjects," Psychological Reports 20 (1967):  
635-41.

Bem, S.L. "The Measurement of Psychological Androgyny."  
Journal of Consulting and Clinical Psychology 42  
(1974): 155-162.

Bem, Sandra L.; Martyna, Wendy; and Watson, Carol. "One  
Consequence of Psychological Androgyny, Journal of  
Personality and Social Psychology, Vol. 31, No. 4,  
(1975): 636.

- Bem, Sandra L.; Martyna, Wendy; and Watson, Carol. "Sex Typing and Androgyny: Further Explorations of the Expressive Domain," Journal of Personality and Social Psychology, Vol. 34, No. 5 (1976): 1021-1022.
- Bem, Sandra Lipsitz, "Theory and Measurement of Androgyny: A Reply to the Pedhazur-Tetenbaum and Locksley-Colten Critiques," Journal of Personality and Social Psychology, 37 No. 6 (1979): 1047-1054.
- Biersner, R.J., And Cameron, B.J. "Betting Preferences and Personality Characteristics of Navy Divers," Aerospace Medicine 41 (1970): 1289-1291.
- Biersner, R.J. And Ryman, D.H., "Prediction of SCUBA Training Performance," Journal of Applied Psychology 59 (1974): pp. 519-521; D.H. Ryman and R.J. Beirsner, "Attitudes Predictive of Diving Training Success," Personnel Psychology 28 (1975) pp. 181-188.
- Biersner, R.J. and Ryman, D.H. "Psychiatric Incidence Among Military Divers," Military Medicine 139 (1974): 633-5.
- Caneva, S. and Zuin, G.C. "Psychological Evaluation of SCUBA Divers." The Research Quarterly 47 (1968): 175-179, 247-253.
- Constantiople, A., "Masculinity-femininity: An Exception to a Famous Dictum" Psychological Bulletin 80 (1973): 389-407.
- Cronbach, L.J. "Outdoor Adventure Training." Leisure Today (April 1978): pp. 11-14 (An editorial insert in the Journal of Physical Education and Recreation April 1978, p. 35.)
- Farley, F.H. and Farley, S.V. "Extraversion and Stimulus-Seeking Motivation." Journal of Consulting Psychology 31 (1967): 215-216.
- Fenz, W.D. and Brown, M. "Betting Preferences and Personality Characteristics of Sport Parachutists." Aerospace Medicine (39-1968): pp. 175-76: W.D. Fenz, "Stress and Its Mastery: Predicting from Laboratory to Real Life." Canadian Journal of Behavioral Science (5-1973): pp. 332, 346.
- Gunderson, E.K., Rahe, R.H. and Arthur, R.J. "Prediction of Performance in Stressful Underwater Demolition Training." Journal of Applied Psychology 56 (1972): 340-342.

- Hoyt, C. "Test Reliability Estimated by Analysis of Variance." Psychometrika 6 (1941): 153-160.
- Kenyon, G.S. "A Conceptual Model for Characterizing Physical Activity." Research Quarterly 39 (1968a): 96-105.
- Kenyon, G.S. "Six Scales for Assessing Attitude Toward Physical Activity." Research Quarterly 39 (1968b): 566-74.
- Meier, J.F. "Is the Risk Worth Taking?" Leisure Today, An editorial insert in the Journal of Physical Education and Recreation of the American Alliance for Health, Physical Education, and Recreation, April 1978-26, p. 7.
- Nisbett, Richard E. "Birth Order and Participation in Dangerous Sports." Journal of Personality and Social Psychology, Vol. 8, No. 4 (1968): 351-3.
- Peterson, C.A. "The Right to Risk." (April 1978): pp. 23-24. An editorial insert in the Journal of Physical Education and Recreation, April 1978, pp. 47-48.
- Rotter, J.B. "Generalized Expectancies for Internal Versus External Control of Reinforcement." Psychological Monographs, 1966, 80 (A, Whole No. 609).
- Schneider, J.M. "College Students' Belief in Personal Control." 1966-70. Journal of Individual Psychology. (1971): 7, 188.
- Schreyer, R.M.; White, B.; and McCool, S.F. "Common Attributes Uncommonly Exercised." Leisure Today. (An editorial insert in the Journal of Physical Education and Recreation of the American Alliance for Health, Physical Education, and Recreation. (April 1978): 36-38.
- Taylor, J.A. "A Personality Scale of Manifest Anxiety." Journal of Abnormal and Social Psychology 48 (1953): 285-290.
- Webster, S.E. "Project Adventure a Trip into the Unknown." Leisure Today (April 1978): pp. 15-17; An editorial insert in the Journal of Physical Education and Recreation. April 1978, p. 39-41.
- White, R.W. "Motivation Reconsidered: The Concept of Competence." Psychological Review 66 (1959): 313-24.

- Zuckerman, M.; Persky, H.; Hopkins, T.R.; Murtaugh, T.; and Schilling, M. "Comparison of Stress Effects of Perceptual and Social Isolation." Archives of General Psychiatry 4 (1966): 356-65.
- Zuckerman, M. and Link, K. "Construct Validity for the Sensation-Seeking Scale." Journal of Consulting and Clinical Psychology 32 (1968): 420-426.
- Zuckerman, M. "Dimensions of Sensation-Seeking." Journal of Consulting and Clinical Psychology 36 (1971): 45-52.
- Zuckerman, M. "The Development of an Affect Adjective Check for the Measurement of Anxiety." Journal of Consulting Psychology 24 (1950): 457-462.
- Zuckerman, M. "The Search for High Sensation." Psychology Today. February 1978, pp. 38-40, 96, 98.
- Zuckerman, M. "The Sensation-Seeking Motive." Progress in Experimental Personality Research 7 (1974).
- Zuckerman, M.; Schultz, D.P.; and Hopkins, T.R. "Sensation Seeking and Volunteering for Sensory Deprivation and Hypnosis Experiments." Journal of Consulting Psychology 31 (1967): 358-63.

### Reports

- Ambler, R.K.; Berkshire, J.R.; and O'Connor, W.F. U.S. Naval School of Aviation Med. Rept. No. 33, (1961).
- Hardy, Jon. Report Justifying Repeal of the Los Angeles County SCUBA Diving Ordinance. Ashton: CNCA Headquarters, 1974.
- "1979 Readers Survey." Skin Diver. Petersen Publishing Company, 1979, p. 3-6.
- Society of Actuaries. Transaction-1976 Reports, 1977, pp. 93-103.
- U.S. Navy Ex. Div. Unit Res. Rpt., T.E. Berthage. Summary Statistics: U.S. Navy Diving Accidents. 1-66. 1966; U.S. Navy Ex. Div. Unit Res. Tpt., Doll, R.E. and Berthage, T.E. Interrelationships of Several Parameters of Decompression Sickness, 7-65. 1967.

### Other Sources

- Helmreich, R.L. Prolonged Stress in Sea Lab II: A Field Study of Individual and Group Reactions. Unpublished doctoral dissertation, Yale University, 1966.
- Kiehlauch, J.B. "Selected Changes Over Time in Internal-External Control Expectancies of Reformatory Population." Ph.D. Dissertation, Kansas State University, 1967.
- Myers, T.I. Personal Communication With Marvin Zuckerman. August 1967.
- Rose, K.G. and Heyman, S.R. Prediction of Performance in SCUBA Divers. Paper presented to the 1979 YMCA Instructor's Convention, Key West, Florida. May 18, 1979.
- Strykowski, J. Keynote Address. Presented at the 1976 Southwest Area YMCA SCUBA Instructor's Convention, Dallas, Texas. November 11, 1976.
- Yanser, S.B.H. "Personal and Interpersonal Effects of Outdoor Survival." Master's Thesis, Brigham Young University, 1971, p. 9.

## APPENDICES

PLEASE NOTE:

Copyrighted materials in this document have not been filmed at the request of the author. They are available for consultation, however, in the author's university library.

These consist of pages:

118-131

134-145

University  
Microfilms  
International

300 N. ZEEB RD., ANN ARBOR, MI 48106 (313) 761-4700

## APPENDIX E

Self-Evaluation Questionnaire  
 Developed by C.D. Spielberger, R.D. Gorsuch and R. Lushene  
 STAI FORM X-1  
 STATE

Name \_\_\_\_\_ Date \_\_\_\_\_

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you feel right now, that is, at this moment. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	NOT AT ALL	SOMEWHAT	MODERATELY SO	VERY MUCH SO
R= 1,2,5,8,10,11,15,16,19,20				
1. I feel calm	1	2	3	4R
2. I feel secure	1	2	3	4R
3. I am tense	1	2	3	4
4. I am regretful	1	2	3	4
5. I feel at ease	1	2	3	4R
6. I feel upset	1	2	3	4
7. I am presently worrying over possible misfortunes	1	2	3	4
8. I feel rested	1	2	3	4R
9. I feel anxious	1	2	3	4I
10. I feel comfortable	1	2	3	4R
11. I feel self-confident	1	2	3	4R
12. I feel nervous	1	2	3	4
13. I am jittery	1	2	3	4
14. I feel "high strung"	1	2	3	4
15. I am relaxed	1	2	3	4R
16. I feel content	1	2	3	4R
17. I am worried	1	2	3	4
18. I feel overexcited and "rattled"	1	2	3	4
19. I feel joyful	1	2	3	4R
20. I feel pleasant	1	2	3	4R

(F-R)+50= \_\_\_\_\_

Self-Evaluation Questionnaire  
STAI FORM X-2  
TRAIT

Name \_\_\_\_\_ Date \_\_\_\_\_

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you generally feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel.

		NOT AT ALL	SOMEWHAT	MODERATELY SO	VERY MUCH SO
	R=21,26,27,30,33,36,39				
21.	I feel pleasant	R1	2	3	4
22.	I tire quickly	1	2	3	4
23.	I feel like crying	1	2	3	4
24.	I wish I could be as happy as others seem to be	1	2	3	4
25.	I am losing out on things because I can't make up my mind soon enough	1	2	3	4
26.	I feel rested	R1	2	3	4
27.	I am "calm, cool, and rested"	R1	2	3	4
28.	I feel that difficulties are piling up so that I cannot overcome them	1	2	3	4
29.	I worry too much over something that really doesn't matter	1	2	3	4
30.	I am happy	R1	2	3	4
31.	I am inclined to take things hard	1	2	3	4
32.	I lack self-confidence	1	2	3	4
33.	I feel secure	R1	2	3	4
34.	I try to avoid facing a crisis or difficulty	1	2	3	4
35.	I feel blue	1	2	3	4
36.	I am content	R1	2	3	4
37.	Some unimportant thought runs through my mind and bothers me	1	2	3	4
38.	I take disappointments so keenly that I can't put them out of my mind	1	2	3	4
39.	I am a steady person	R1	2	3	4
40.	I get in a state of tension or turmoil as I think over my recent concerns and interests	1	2	3	4

Fur      R  
( ) - ( ) + 35= \_\_\_\_\_