THE RELATIONSHIP BETWEEN PILOT PROPENSITY TO TAKE RISK AND TOTAL HOURS OF FLIGHT EXPERIENCE

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1970

Submitted to the Faculty of the
Graduate College of the
Oklahoma State University
in partial fulfillment of
the requirements for
the Degree of
MASTER OF SCIENCE
December, 1992

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ACKNOWLEDGEMENTS

I wish to express my sincerest appreciation to the many friends, family and colleagues who assisted and supported me throughout this project. I especially would like to thank Dr. John Baird for his expert guidance as my thesis adviser and for his skill in clearing the many hurdles we faced together. I am honored to be his final student at Oklahoma State University and wish him every success in the future.

Appreciation is also forwarded to Dr. Cecil Dugger and Dr. Gene Smith. Their comments and recommendations as members of my Masters Committee provided valuable direction to my educational endeavor. A special vote of gratitude is further extended to Dr. Melvin Miller for his guidance and direction in coordinating the successful completion of my graduate degree program.

Thanks also to Lieutenant Colonel Philip Pearce, Queen's Regiment, British Army for his expert advice and friendship throughout this project. I would like to thank the clerical staff of the OSU School of Occupational and Adult Education for their expertise in attending to the many important administrative details of this thesis.

Finally, I especially wish to thank my wonderful wife, Anne, for her strong support, unending motivation, and loving understanding. I couldn't have done it without you!

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CHAPTER I

INTRODUCTION

Background Information

In 1990, there were a total of 2,138 accidents in general aviation which accounted for the 736 fatalities that year (Aircraft Owners and Pilot's Association [AOPA], 1992). Although these figures were lower than those for 1980 (by nearly 40%) and 1985 (by 33%), they still represented a substantial cost in terms of human lives lost. In the past aviation accidents have quite often been attributed to unnecessary risk-taking by the pilot, and were usually placed under the general heading of pilot error. A common assumption for many years in the field of aviation has been that a more experienced pilot, in terms of flying hours, was generally a safer pilot. The safety records of senior captains of major airlines were often cited as examples of this fact, and helped establish the use of total flying hours as a criterion for the hiring of new pilots. Today, airline, commercial, and corporate pilot job applications routinely ask the applicant to list his or her total number of flying hours. The Federal Aviation Administration (FAA) has shown some concern in the past about this possible link between pilot experience and increased risk. Former FAA

Chief Alan McArtor noted that although an inexperienced pilot may be as qualified as one with more experience, experience adds "familiarity, confidence and proficiency to the pilot's repertoire" (Parker, 1988). Additionally, the aviation insurance industry has long supported the theory of a relationship between experience and risk, with this relationship reflected in higher or lower aviation insurance premiums. Generally, these premiums have been considerably lower for the pilot who had, or the corporation whose pilots had, greater experience in terms of flying hours. The pilot's total number of flying hours has been a question often asked by insurance companies on both personal and corporate policy applications. One Aviation Supplement (Traveler's Insurance Company, Ed. 3-88) required the applicant to list total hours flown as a student pilot, pilot or copilot and crew member. Additionally, information was requested on total experience as either a military or civilian pilot.

This emphasis by the aviation community on total flying hours has led to its solid standing as the benchmark for determination of risk, experience, and the assumption of overall pilot competency.

Statement of the Problem

This thesis addressed the problem of whether or not a relationship existed between an aircraft pilot's propensity to take risk, as measured by scores on the Risk - Taking - Attitude - Values Inventory (RTAVI), and the experience

level of the pilot, as determined by his total number of accumulated flight hours. It has been expressed by some that it may not have been as much the experience level of the pilot as it was his, or her, propensity to assume greater or lesser risk while flying. Also, it has been argued (Collins, 1981) that pilots tended to pass through phases throughout their aviation careers where they were more, or less, likely to have an accident than at other times. Results of this research could have significant implications for future aviation safety through increased awareness by pilots or inclusion in formal programs developed by the general aviation training community.

The research described in this thesis was solely designed in an effort to explore only a portion of the vast potential research possible in this area and examined only the particular relationship believed to exist between pilot experience level and pilot propensity for risk-taking.

Purpose of the Study

The major purpose of this study was to investigate the possible relationship between pilot propensity to take risk and the pilot's total number of accumulated hours of flight experience. This has been an important aspect of human behavior related to aircraft pilots which has not been fully investigated in past aviation related research. This problem has received some limited attention in prior literature on aviation, but it has rarely been clearly defined or investigated in depth. The strength of this

particular research project was founded in its simplicity. By focusing attention on a minimum number of select variables, the probability of observing a possible relationship between the predictor and the criterion variables was significantly enhanced.

Hypothesis

The hypothesis of this research was, simply stated, that a statistically significant relationship between an aircraft pilot's propensity to take risk and the experience level of the pilot was believed to exist. In this context, the criterion variable of pilot propensity to take risk was defined as the pilot's ability to make decisions when confronted with flight situations where the outcome was unsure and the element of risk became a factor in deciding on an appropriate course of action. Furthermore, for the purposes of this research, the propensity to take risk was defined in terms of Behavior Style and Need scores obtained on the Risk-Taking-Attitude-Values Inventory (RTAVI) (Carney, 1976). The predictor variable of pilot experience was defined for this study as that level of competence assumed to be reached as a function of continued experience in the cockpit. This factor has been universally expressed within the aviation community, and was operationally defined for the purposes of this study, in terms of the pilot's total number of hours flown.

CHAPTER II

REVIEW OF LITERATURE

Risk management in aviation has been a topic often addressed in flight publications, newspapers, journals, books and discussed during aviation safety seminars. Authors have been quick to describe an aircraft accident scenario where a pilot made a serious, and often fatal, mistake. They would proceed to reconstruct the series of events which led up to the accident or incident in question, and would usually wax lyrical over what the pilot should, or should not, have done in each particular situation. Generally, these, after the fact, exposés have been moderately interesting and somewhat informative. However, they have seldom been very successful in preventing aircraft accidents, since pilots have rarely subsequently faced the identical set of circumstances described by the author. On the other hand, of greater utility have been those articles which have focused attention on the root causes of accidents. These authors have properly viewed the pilot in the proper perspective as a human being, with all of the associated faults and failings. Collins (1992) wrote in reference to one of the various ways pilots seem to put themselves at risk. He stated that pilots often make "that extra effort to get back to the familiar hearth" (p. 71).

He went on to speculate that "more airplanes are lost on the way home than are lost on the way to somewhere else" (p. 71). Schiff (1992) described this behavior as "focusing so intently on reaching a destination that a pilot loses his safety perspective..." (p. 97). He further suggested that "although seldom cited in accident reports as a probable cause, it undoubtedly is an underlying reason for a great number of general aviation tragedies" (p. 97).

Research into pilot behavioral factors has received only sporadic attention in the past, with most emphasis the result of some catastrophic aviation event. Parker (1988) expressed the following in response to this apparent lack of concern:

> A plan to develop cockpit resource management, as the training is called, was written by the FAA in 1983 after a rash of pilot-caused crashes in the late 1970's, but the project was never funded. Research was nearly at a standstill until the Detroit accident, in which 156 people perished, jolted the FAA into resurrecting the concept. (no page number cited)

While readily acknowledged, this concept of risk has seen only vague definition in the past. Authors have found it difficult to produce a positive and concrete definition of risk, let alone adequately describe its pathology. The dictionary (Webster's New World, 1987) has simply defined risk as "the chance of injury, damage, or loss" (p. 516). Similarly negative was Urquhart and Heilmann's (1984) definition of risk as "...the probability that something bad will happen" (p. xvi). Likewise, Keyes' (1985) definition

portrayed risk as "an act involving fear of possible loss" (p. 24). He further purported that "more than any other factor...dread has been found to determine our perception of risk" (p. 23). Or, as described by Brockhaus (1980):

> The propensity for risk taking is defined as the perceived probability of receiving the rewards associated with success of a propose situation, which is required by an individual before he will subject himself to the consequences associated with failure, the alternative situation providing less reward as well as less severe consequences than the proposed situation. (p. 513)

As used in previous research, and on a somewhat more positive note, risk-taking propensity has come to be described simply as that behavior where a desired goal was linked to the uncertainty that the goal could be obtained (Kogan and Wallach, 1967, p. 115).

Risk, as Kogan and Wallach defined it, had two aspects. Firstly, a chance aspect which was based on the probabilities of the various outcomes and, secondly, a danger aspect which was based on the severity of the consequences in the risk-taking situation. When confronted with a situation involving risk a subject must both evaluate the desirability of a given alternative, as well as, consider the likelihood of achieving the given alternative. Furthermore, several authors, such as Atkinson (1957); Meyer, Walker and Litwin (1961); McClelleand (1965); Murray (1984); Aero and Weiner (1985); and Shwiel (1986), have identified a link between risk-taking and the need for achievement (Master & Gibbs, 1989). Luthans (1985) also suggested that risk-taking, at a moderate level, was one of

the most descriptive characteristics of a high achievement-oriented personality.

Previous Research

This concept of "willingness to take risks" (Guion, 1965, p. 51) has been addressed across a wide spectrum and "a variety of approaches has been developed to represent risk-taking propensity" (Handbook of Industrial and Organizational Psychology, 1983, p. 1440). Measurement concepts such as: "the utility function (Friedman & Savage, 1948)" (p. 1440), "the mean-variance criterion (Markowitz, 1959)" (p. 1440), as well as those "measures developed in psychological literature (e.g. Atkinson, 1957; Kogan & Wallach, 1964; and Shure & Meeker, 1967)" (p. 1440) have all attempted to quantify this concept of risk propensity.

While little prior research has been found in aviation related literature to specifically support the theory that certain factors, such as a pilot's propensity to take risk, correlated significantly to experience level, a few authors have cited similar relationships in other areas.

The studies of Kogan and Wallach (1961) and Botwinick (1966) have been a few which have investigated the concept of risk-taking as it related to chronological age. In their investigations they contrasted questionnaire responses of widely separated age groups to emphasize differences between response patterns. These early attempts generally centered attention on the hypothesis of increased conservatism with increased age. Researchers have tended to agree that as

individuals age their propensity for engaging in risk-taking behavior diminished and they became increasingly more conservative. Botwinick (1966) stated that the weight of evidence supported such a relationship independently of the possible confounding cultural influences upon age groups.

Kogan and Wallach (1961) concluded that under conditions of high confidence, extremes of judgement decreased with increased age. They further theorized that, although the degree of perceived disinterest in failure increased with age, it appeared less situation directed and more generalized. In this context, the element of caution was characterized as entailing both high deterrence of failure and high subjective probability of failure.

An earlier study using college-age subjects (1960) showed significant correlations between the evaluation of risk-relevant concepts and certainty of judgement. Evaluation of risk in this study was measured by semantic differential responses to terms such as risk, jet pilot, stockmarket, etc. It assumed that a individual's ratings of these risk-related items indicated one's feelings regarding risk-taking in general.

Whereas Wallach and Kogan used choice dilemmas in which a relatively young person was the central character, Botwinick (1966) developed a number of choice situations involving elderly central characters. In his research, Botwinick found that older subjects generally did not choose a risky alternative regardless of outcome. He stressed the importance placed on cautiousness within groups of elderly

subjects. The results of Botwinick's research, then, would lead one to imply that as a person aged increased rigidity of behavior would deter them from engaging in risk-taking. Collins (1981) described undocumented research which attempted to show a relationship between pilot chronological age and aviation safety. He indicated that "there are some things in the record to suggest a relatively minor relationship between a pilot's age and the ability to operate airplanes safely" (p. 241-242). Collins also identified several age groups which were believed to represent periods during which pilots were either more or less safe. Unfortunately, in his book, Collins provided few clues as to the specific source of the accident statistics cited and little information on the exact population in question or the size of the sample. He did occasionally relate pilot accidents to automobile accident statistics, but, here again, offered no specific references. Collins did, however, make some interesting comparisons between pilot chronological age and aviation safety. Although not substantiated by documented research, his conclusions did seem to indicate that there were identifiable periods throughout a pilot's aviation career when distinct behavioral changes occurred. During these phases certain factors were more likely to have an effect on pilot performance and flight safety. For instance, he stated that "the youngest pilots tend to do the best" (p. 242), with the 16 to 19 year old age group experiencing "fatal accidents at a rate of about one-half the percentage of this group's

representation in the total number of pilots" (p. 242). Furthermore, these favorable statistics continued through the next phase in the early twenties, before they began to wane among pilots in their early thirties. Next, pilots between age 40 to 44 seemed to indicate the highest risk, with this group having demonstrated the worst accident rate. Beyond this age group the situation seemed to improve, and indications were that pilots in their early fifties tended to do somewhat better. The best record, however, as indicated by Collins, was seen with pilots in their mid to late fifties. Finally, "the senior pilots, those over sixty, had more problems than...expected in this sample" (p. 245). Although his report lacked strict scientific research methodology, Collins did seem to indicate a possible curvilinear relationship between chronological age and a pilot's ability to operate an aircraft safely.

In another aviation-related study, O'Hare (1990) compared pilot willingness to take risks with the pilot's perception of his own ability as an aviator. Here, through the use of an aeronautical risk judgement questionnaire and a computerized test of flight decision-making, O'Hare obtained data on each pilot's perception of their abilities, willingness to take risks, hazard awareness, and judgement of the risks inherent in general aviation. O'Hare found that more experienced pilots generally scored higher on an index of personal invulnerability than inexperienced pilots. These pilots tended to rate themselves as more willing to take risks and, although in some cases were younger in age

than other pilots, had greater experience in terms of total hours flown.

The Federal Aviation Administration addressed this problem of risk-taking in a slightly different way. In their advisory circular, Human Behavior : the no.1 cause of accidents (Federal Aviation Administration [FAA], no date), they suggested that most accidents shared a common element. In other words, "they were precipitated by some human failing rather than mechanical malfunction" (FAA, p. 2). The author added that in many accident cases, where the pilot had survived an accident, the pilot admitted to having engaged in risk-taking behavior prior to the accident. Many pilots were aware that they had made a potentially dangerous decision, "but in the interest of expediency, cost saving, self-gratification, or similar irrelevant factors" (p .2) chose, instead, to tempt fate by selecting an obviously "wrong course of action" (p .2). This article cited as its sole source a 1971 study on "accident proneness by Shaw and Sichel" (p .2) in which several common human traits were compared as either bad or good accident risks. The author indicated that the pilot's behavior as a bad accident risk was related to his or her emotional weakness and the inability to recognize that he or she was "not in possession of all the facts for all situations...."(p .3). Although providing an interesting look at some of the common traits of pilots who were classified as good and bad risks, this FAA circular unfortunately lacked the support of extensive previous research.

Limitations of Previous Research

One significant limitation of previous research has been the widely divergent age groups used in many studies. Young adult subjects have been limited to college undergraduates in nearly all major studies. In addition, the few researchers who have correlated risk-taking to aging have used an elderly sample, generally with subjects older than 70 years of age (Wallach and Kogan, 1961; Botwinick, 1966, 1969). Such limited and inharmonious samples have, unfortunately, placed restrictions upon the potential generalizations which could have been made regarding changes over the subject's entire life span. A broader sampling of subjects across the life span is necessary before any solid conclusions can be reached.

Furthermore, methodological considerations have been seen partially to determine level of risk-taking, with the role of personality characteristics depending largely on the specific context being considered.

The present research attempted to study adults across the life span, within the constraints of the accessible population, in an effort to identify possible trends in risk-taking propensity among various experience levels. This effort further attempted to identify those behavioral characteristics which would likely be significant in risk-taking personalities.

CHAPTER III

METHODOLOGY

Subjects

The target population for this research was fixed-wing general aviation aircraft pilots. More specifically, this research could only be considered applicable to those pilots engaged in organized flying club activities with fixed-wing aircraft within Europe. No other distinctions were made between pilots of different aircraft categories or classes as defined in United States Federal Aviation Regulation, Part 61.5 (1990). Likewise, no differentiation was made in terms of nationality, gender, race, religion, or between civilian and military pilots. Data collected on these aspects was used solely as a source to identify better the demographic characteristics of the accessible population. Thus, no assumptions should be made regarding the applicability of this research to any other pilot population.

The sample for this research was composed of volunteers drawn from the accessible population, the active membership of the Supreme Headquarters Allied Powers Europe (SHAPE) Flying Association, Chievres Air Base, Belgium. Although lacking the advantages of a randomly selected group, this

sample was believed to represent an accurate cross-section of the target population and offered the variety and scope of aviation experience required to test the null hypothesis. The accessible population for this research numbered approximately 65 pilots of differing nationalities, experience levels, and ages. The accessible population in this study was composed primarily of male subjects. The ready availability of this group enhanced the expediency with which this project was completed, resulting in better management of overall costs while providing timely results.

Instruments

The success of this research in correlating a pilot's propensity to take risks to the experience level of the pilot depended, ultimately, upon accurate measurement of both variables. Since, for the purposes of this research, pilot experience level was defined as the pilot's total accumulated flying hours, pilots were requested to provide this information. A form was included in each subject's testing packet which requested the pilot's total flight hours, as well as other demographic data deemed necessary for this research (see Appendix A for sample form).

In order to measure the subject's propensity for risk, a standardized instrument was used. The Risk - Taking - Attitude - Values Inventory (RTAVI) (Mature adult level) (see Appendix B for replica) was selected to assess each subject's propensity to take risk. This instrument was developed to assess "drug-abuse educational programs"

(Buros, 1978, p. 658) and was "claimed to have general value in providing information on values and behavior in many individual and group applications" (p. 658). Its design was "based on a theory of choice behavior in risky situations" (Carney, 1976, p. 1) and combined the best features of the Risk-Taking Attitude Questionnaire (RTAQ) and the related Behavioral Values Inventory (BVI). The RTAVI also offered the best combination of structure, content and predictive ability required for this study, and was the instrument recommended by the American Society for Training and Development (personal communication, February 6, 1992).

Collection of the Data

Members of the SHAPE Flying Association were invited by letter (see Appendix C for sample letter) to participate in this study. In these letters to association members only essential details as to the purpose of the research were provided. Details which could have conceivably jeopardized the objectivity of the research or of the test instrument were omitted.

It was originally intended that subjects would be tested in groups at the SHAPE Flying Association classroom or at similar locations within the Supreme Headquarters Allied Powers Europe office complex. However, it was soon clear that this procedure would be impossible since many subjects indicated conflicts with duty, business travel and vacation schedules. As a alternative plan, subjects were instead sent testing packets either to their office location

through the headquarters distribution system, or to their home through the Belgian postal service. Each test packet was identical, with the subject first receiving a letter summarizing the purpose of the study and requesting the subject's participation (see Appendix C for sample letter). If the subject agreed to participate he was then directed to follow the instructions outlined on a second letter contained in the packet (see Appendix D for sample letter). Included also was a Research Consent Form which delineated the subject's legal rights as a participant in this research (see Appendix E for sample form). It was requested that the Research Consent Form be returned separately from the testing instrument and a return address label was attached to the form to aid in this process. The final document included in the testing packet was a copy of the Risk-Taking-Attitude-Values Inventory (RTAVI). Additionally, each copy of the RTAVI was modified with a Demographic Background Data Form (see Appendix A for sample form). This modification was needed to gather demographic data specific to this study rather than that routinely required for other uses of this instrument.

For those subjects wishing to know the final results of this research, names and mailing addresses were requested on the Research Consent Form. A summary of the findings in abstract form was sent to those subjects following completion of the research project.

Ethical and Legal Considerations

Procedures for this research were designed with the legal rights of the subject as a primary concern. These procedures were implemented in accordance with the principles established by the American Psychological Association (APA, 1963). Specifically, those principles which addressed the areas of responsibility, moral and legal standards, confidentiality, test interpretation, and research precautions were emphasized (APA, 1963). Other principles listed under Ethical Standards of Psychologists, when applicable, were also considered. All subjects were provided a Research Consent Form (see Appendix E for sample form) outlining the importance of this research and emphasizing their legal right to choose whether or not to participate. Subjects were given the opportunity to read this form prior to testing and were requested to sign the form indicating their willingness to participate. Additionally, subjects were advised in paragraph 2b. of the instructions letter of the option to exclude answering any questions which they felt were too sensitive. As a matter of interest, no subject chose to exercise this right. Tests to be destroyed would have been sealed in a separate envelope, marked for destruction, and later destroyed. Destruction procedures were to be the same as those for the destruction of military classified material, with tests shredded and subsequently burned.

The potential for physical, psychological, and emotional harm as a result of this research was considered to be minimal. All testing and data-gathering procedures incorporated within this study were designed with the safety of the subject as a primary objective. Close control and security of all personal data were maintained during the testing, data analysis, and post-research phases. At no time were individuals, other than those specifically designated by the researcher, permitted to view data contained on any subject's demographic data form or test instrument. Likewise, names or other items of personal identification were not placed on any test or data collection document. An exception was made for the research consent form, which was maintained separately from each subject's test packet.

Analysis of the Data

Measurement was accomplished for this study during the summer semester of 1992. Data collected as a result of this research were analyzed manually. Statistical procedures were performed in accordance with the established methods outlined in selected reference documents (Ary, Jacobs, Razavich, 1985; Sharp, 1982). All subject responses were checked and confirmed prior to recording for score.

Limitations of this Research

Confounding variables such as the chronological age and nationality of the subject, as well as each individual's

ability to read and comprehend English, could have jeopardized the validity of the results of this research. This research was also hindered by the multitude of factors and differences between types and categories of aircraft, variety and level of experience among pilots in civil, military and commercial aviation, as well as the many behavioral differences already assumed to exist between subjects. Furthermore, the fact that the subjects were not selected at random, nor randomly assigned to groups, prevented accurate generalization of the results of this research to many pilot populations. Finally, the possible weaknesses of the RTAVI as the most suitable test instrument may have prohibited the production of valid evidence of a significant relationship between variables.

CHAPTER IV

RESULTS

This was a correlational study designed to determine whether a degree of relationship existed between the criterion variable of propensity to take risk and the predictor variable of flight experience. Through the use of nonparametric measures, this relationship was tested for indications of a statistically significant coefficient of correlation. Data collected as a result of administration of the Risk-Taking-Attitude-Values Inventory (RTAVI) yielded ordinal data. Data collected through analysis of individual pilot flight hours produced ratio data which was then reduced to ranks (ordinal data). Correlation of these variables was possible through analysis of the raw scores produced by the RTAVI and the reduced subject-supplied flight hours. In this case, the Spearman rho (rank) correlation coefficient (Ary, Jacobs, Razavieh, 1985) proved the most appropriate statistical index to use. This index was designed for analysis of rank-ordered, or ordinal, data when a coefficient of correlation was desired. A predetermined level of statistical significance of .05 was selected for this study, since this represented that level generally accepted for use in similar human behavioral research studies.

Data Analysis

Data are arranged and presented under three subheadings: General Data, Demographic Data, and Specific Findings.

General Data

A total of 65 testing packets were distributed to the active membership of the S.H.A.P.E. Flying association. A total of 29 complete and usable instruments were returned which represented a response rate of 45.6%.

Demographic Data

Demographic information was collected from subject responses on the Demographic Data Form attached to each copy of the Risk-Taking-Attitude-Values Inventory (RTAVI). Data were collected on gender, age, nationality, language spoken in the home, total number of flying hours in fixed-wing aircraft, overall experience expressed in terms of years and months of flying, and type of experience in either civilian or military operations.

The accessible population for this study included both male and female subjects. However, although packets were sent to members of each gender, responses were only received from male subjects. Thus, all data is based on a 100% male population without the representation of the female gender.

The chronological ages of the subjects ranged from 20 to 64 years, with a mean age of 45.9 years. Age data for the subject group are compiled and arranged in Figure 1 in accordance with the general age groups described by Collins (1981) in Chapter 1 of this thesis.

Figure 2 indicates that the nationality of the group was predominantly American with 9 out of 29 or 31% claiming U.S. citizenship. Belgium and Germany were represented by 6 subjects each or 21%. Italy with 3 subjects or 10%. The United Kingdom, Canada, France, The Netherlands, and Norway were represented by 1 subject each or 3%.

Although a minimum ability to read and speak English is required for international flight training, additional data were compiled on the language most frequently spoken by each subject at home. English was the most typical language spoken in the home with 14 out of 29 or 48%. Next, was German with 6 or 21%; French with 5 or 17%; Italian with 3 or 10%; and Dutch with 1 or 3%. (See Figure 3.).

A key element in data collection for this study were the total flying hours of each subject. These ranged from three hours for a student who had recently begun the flight phase of training to 6,000 hours for one of the more senior members of the organization. The mean of the total flying hours for the entire subject population was 1,496.5 hours. Figure 4 depicts subject flying hours in terms of experience levels based on a subjective appraisal by the researcher and is shown only for illustration.

Data on experience in terms of years and months of aviation longevity were gathered in order to further evaluate the experience level of the subject group. The years and months of experience ranged from one month to 35 years of flight experience. The average number of years of flying experience for the group was 14.8 years.

Displayed in Figure 5 are the various types of flying experience exhibited by members of the group. It shows that the vast majority of the subjects (17 out of 29 or 59%) had only civilian flying experience. Seven, or 24%, had mostly military flying experience, but also had some civilian experience as well. Five, or 17%, had mostly civilian flying experience with some mix of military experience.

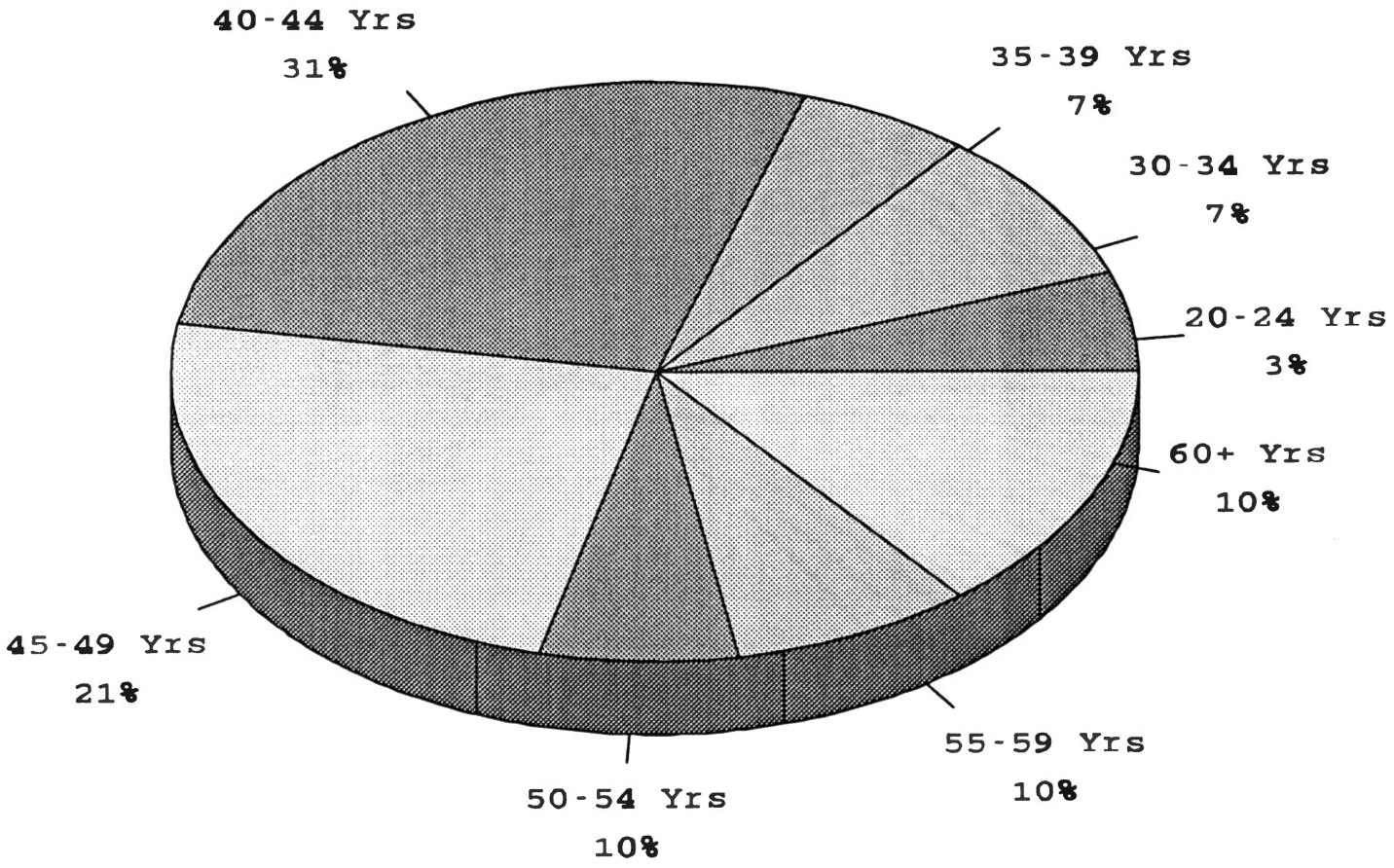

Figure 1. Subject Population by Age

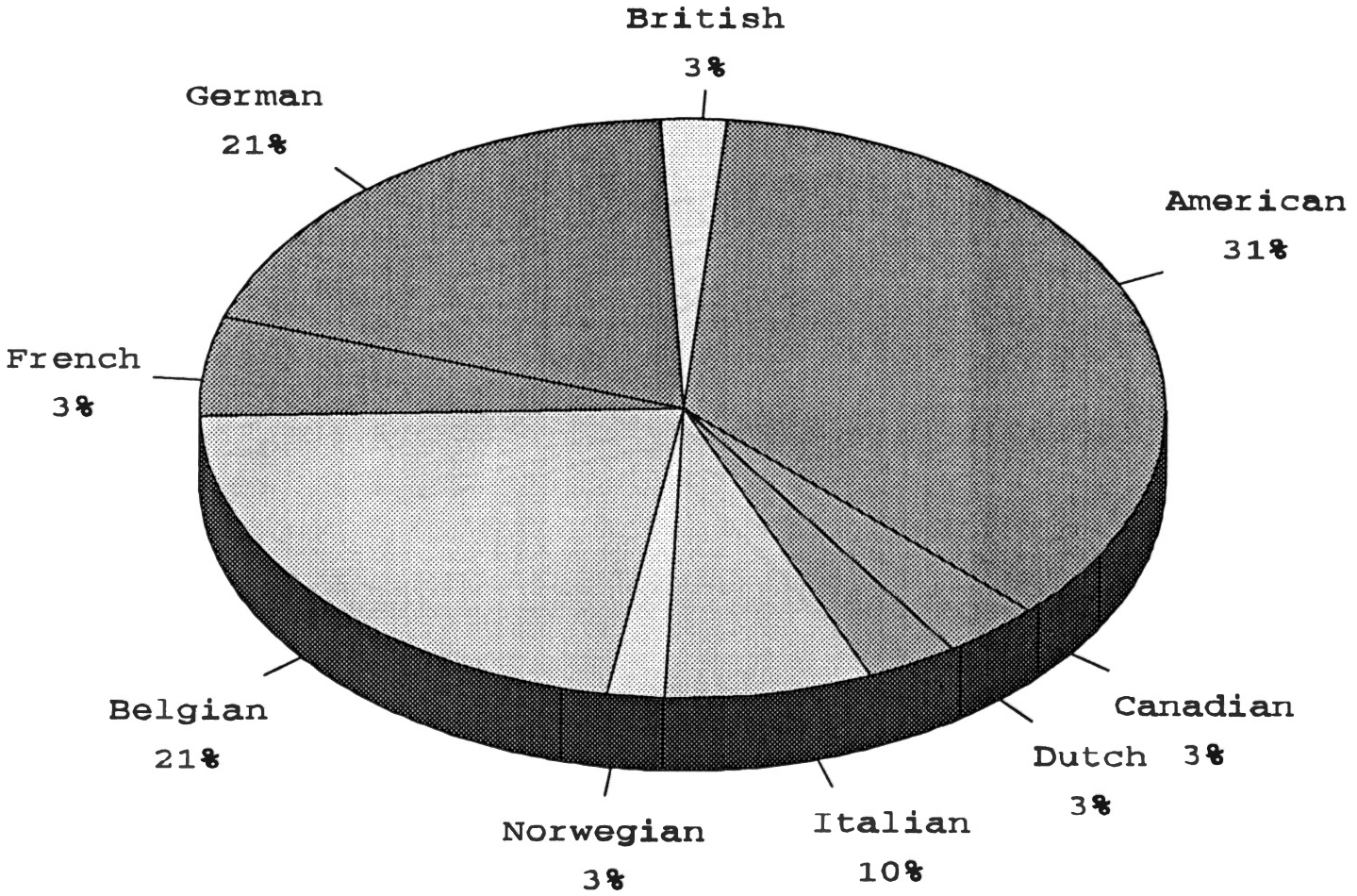

Figure 2. Subject Population by Nationality

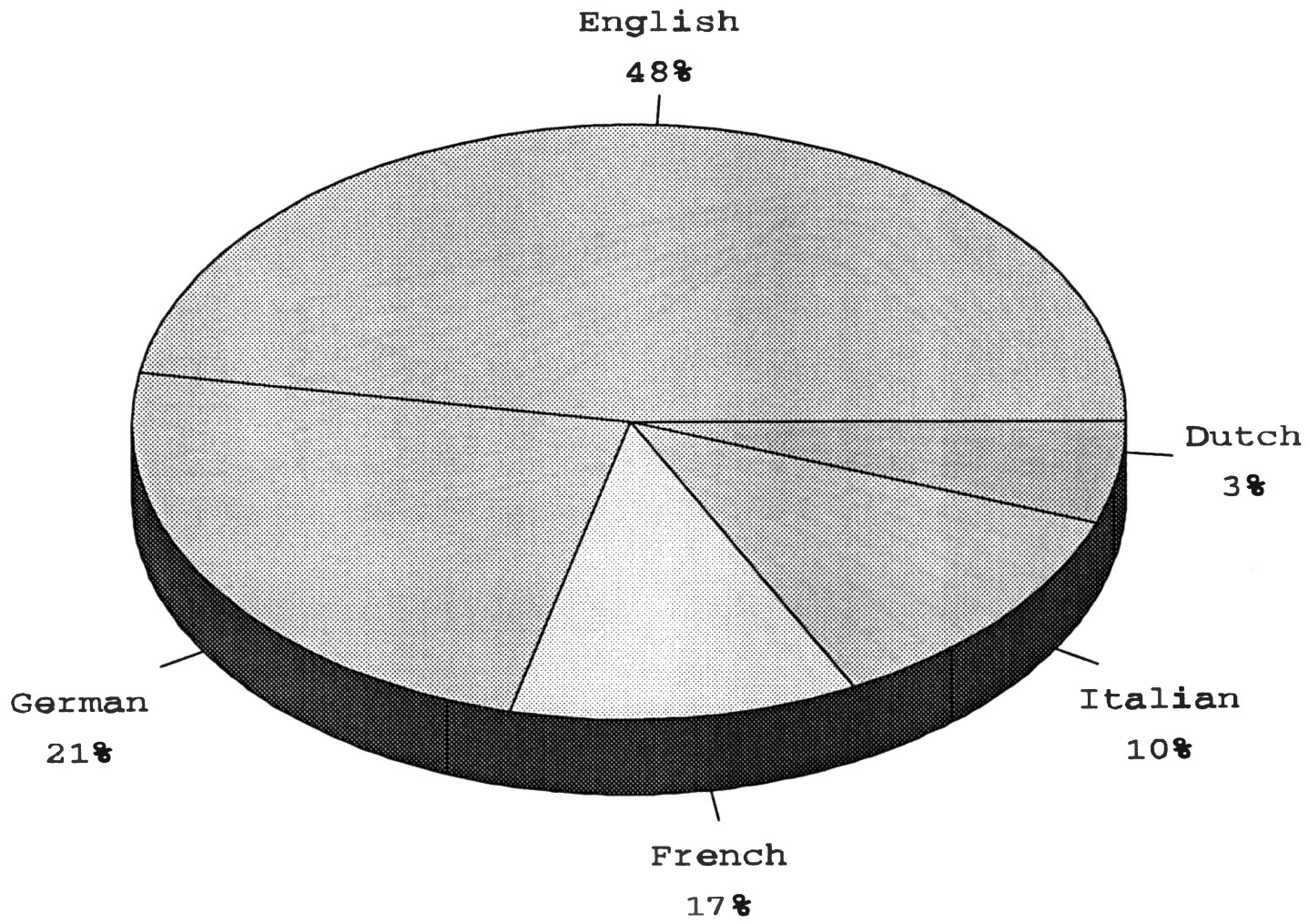

Figure 3. Subject Population by Language

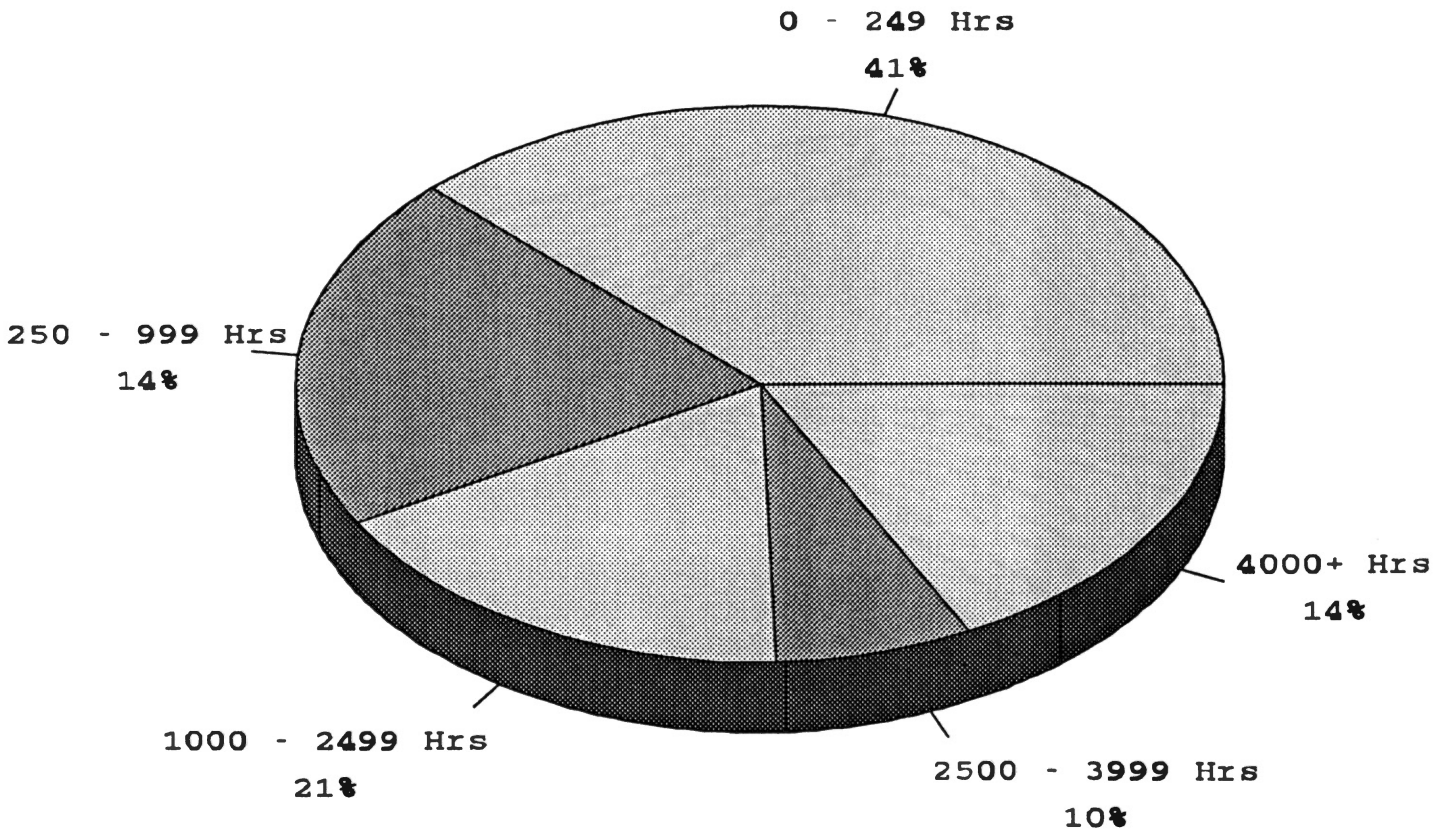

Figure 4. Flight Experience Levels of Subject Population

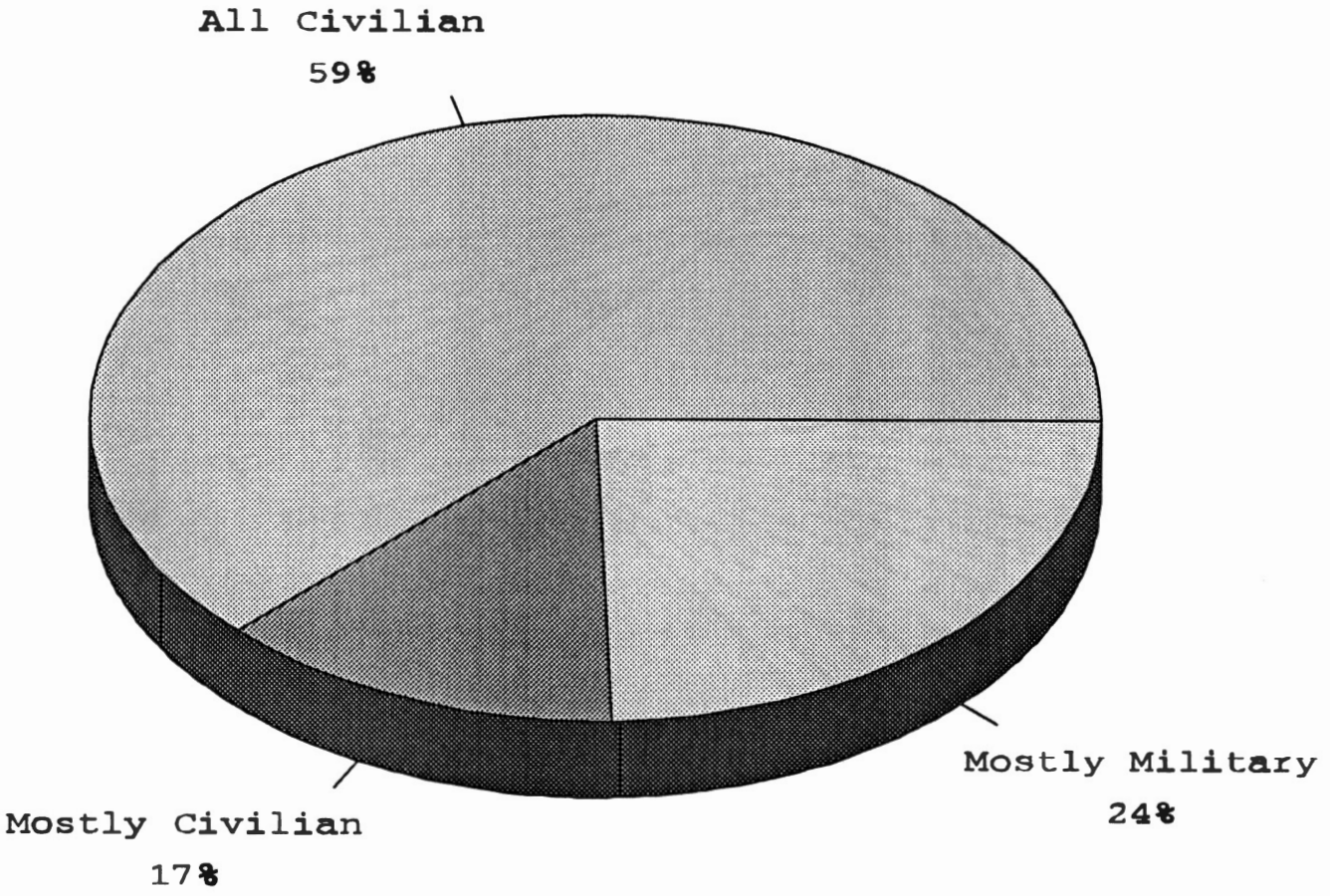

Figure 5. Subject Population by Type of Flight Experience

Specific Findings

Two of the several factors tested by the Risk-Taking-Attitude-Values Inventory (RTAVI) offered the greatest potential for revealing indications of a relationship between total flying hours and risk propensity. The first index, Behavior Potential (BP) scores, "represent the relative likelihood that a given behavior will take place at some future date" (Carney, 1976, p. A-2). When combined these BP scores yield generalized Behavior Styles which have been "empirically derived from detailed correlational analysis of the RTAVI items" (p. A-2). Three Behavior Styles have been defined which are based on the belief that they represent socially recognized behavior patterns. These range from high acceptance, which Carney (1976) terms Socially Approved Behavior (SAB), to low acceptance, or Socially Disapproved Behavior (SDB). Between, and to an extent overlapping, these first two styles is the Masculine Aggressive Behavior (MAB) style. This style has been shown to correlate best with those behavioral factors believed to be "stereotypic of the 'daredevil' male role in our society..." (p. A-10). Table I compares the scores of individual subjects on the Masculine Aggressive Behavior (MAB) style factor of the RTAVI with the each subject's total flying hours. Flight experience is expressed in terms of the total number of accumulated flying hours, to the nearest whole number, as supplied by each subject on his Demographic Background Data Form. The MAB style is

expressed as the raw score derived from summaries of the Behavior Potential (BP) scores for the selected behaviors sampled by the subject's RTAVI.

Table I also presents the associated rankings of individual scores in relation to other scores of the same variable. In a few instances (4 under MAB scores) rankings were tied. In these instances, tied scores were awarded an average position prior to applying the formula for the Spearman rank correlation (Ary, Jacobs, Razavich, 1985).

TABLE I

COMPARISON OF SUBJECT TOTAL FLYING HOURS AND MASCULINE AGGRESSIVE BEHAVIOR (MAB) SCORE

Subject	Flying Hours	Rank	MAB Score	Rank
A	3	1	174	17
B	5	2	141	8.5
C	6	3	196	25
D	12	4	186	21.5
E	23	5	180	19
F	25	6	110	1
G	30	7	140	7
H	35	8	181	20
I	56	9	173	16
J	70	10	162	13
K	120	11	188	23
L	210	12	154	10
M	250	13	178	18
N	350	14	170	15
O	580	15	168	14
P	700	16	137	6
Q	1100	17	121	2
R	1107	18	125	3
S	1500	19	209	28
T	1696	20	202	27
U	2200	21	159	12
V	2300	22	126	4
W	2650	23	132	5
X	3370	24	186	21.5
Y	3800	25	141	8.5
Z	4400	26	198	26
AA	5000	27	210	29
AB	5800	28	155	11
AC	6000	29	193	24

Table II shows the relationship between the variable of flight experience, in terms of total flying hours, and risk propensity, as expressed by the Masculine Aggressive Behavior (MAB) scores. As illustrated below, the calculated Spearman rho (rank) correlation coefficient (p) was calculated to be .0906. This figure was then compared to a table of Critical Values for the Correlation Coefficient (Table L, Sharp, 1982, p. 249) with the result that the computed critical value was determined to be .3013. In this case the proposed significance level of .05 was not exceeded. Thus, the null hypothesis that no statistically significant relationship exists between an aircraft pilot's propensity to take risk and the experience level of the pilot could not be rejected.

TABLE II

RELATIONSHIP OF FLIGHT EXPERIENCE AND MASCULINE AGGRESSIVE BEHAVIOR (MAB) SCORES

	Subject Total Flying Hours	
Risk Propensity Variable	Critical Value	Calculated P Value
Masculine Aggressive Behavior (MAB) Score	.3013	.0906

Level of Significance = .05

The other index of the RTAVI used as a basis for determining a possible link between total flying hours and pilot risk propensity were analyses of the total Need scores. These scores "provide a direct estimation of the level of unfulfilled drive for the eight universal value goals" (Carney, 1976, p. A-6). Other authors "(Atkinson (1957); Meyer, Walker and Litwin (1961); McClelland (1965), Murray (1984); Aero and Weiner (1985); and Shwiel (1986) discussed motives for risk-taking related to high achievement and have established a relationship between risk-taking and the need for achievement" (Masters and Gibbs, 1989, p. 85). Furthermore, Carney (1976) asserts that "high Total Need is characteristic of persons who take high risks to reduce their intolerable frustration level" (p. A-7). This aspect of high Total Need is measured on the RTAVI through a comparison of the "Importance" of certain universal value goals to the subject in comparison to the subject's perceived "Nearness" to achieving these goals (p. A-6). Table III compares the scores of individual subjects on the Total Need (TN) factor of the RTAVI in relation to their total flying hours. As in Table I, flight experience is presented in terms of the subject's total number of accumulated flying hours as supplied on the Demographic Background Data Form. Total Need is expressed as the raw score derived from comparing the components of Need Importance with Need Nearness. In this part of the RTAVI, a high raw score indicates high farness from satisfied needs.

Again, in six instances under the category of Need scores, rankings were tied. As in the previous measurement (MAB scores vs Flight Hours), tied scores were awarded an average position prior to applying the formula for the Spearman rank correlation (Ary, Jacobs, Razavich, 1985).

TABLE III

COMPARISON OF SUBJECT TOTAL FLYING HOURS
AND TOTAL NEED (N) SCORE

Subject	Flying Hours	Rank	NEED Score	Rank
A	3	1	39	27
B	5	2	74	6.5
C	6	3	61	16
D	12	4	74	6.5
E	23	5	59	17
F	25	6	86	1
G	30	7	83	2
H	35	8	43	24
I	56	9	46	22
J	70	10	81	3
K	120	11	72	8
L	210	12	47	21
M	250	13	34	28
N	350	14	32	29
O	580	15	58	18
P	700	16	66	13
Q	1100	17	71	9.5
R	1107	18	65	14.5
S	1500	19	41	25
T	1696	20	77	4
U	2200	21	45	23
V	2300	22	40	26
W	2650	23	68	12
X	3370	24	76	5
Y	3800	25	55	19
Z	4400	26	70	11
AA	5000	27	71	9.5
AB	5800	28	65	14.5
AC	6000	29	53	20

Table IV illustrates the relationship between the variable of flight experience, in terms of total flying hours of the subject, and risk propensity, as expressed in this case by the subject's Total Need (N) scores. As illustrated below, the calculated Spearman rho correlation coefficient (p) was determined to be .0664. This figure, when compared to a table of Critical Values for the Correlation Coefficient (Table L, Sharp, 1982, p. 249), did not exceed the critical value of .3013. As in the previous case the proposed level of significance of .05 was not exceeded. Thus, the null hypothesis that there is no statistically significant relationship between an aircraft pilot's propensity to take risk and the experience level of the pilot could not be rejected.

TABLE IV

RELATIONSHIP OF FLIGHT EXPERIENCE
AND TOTAL NEED SCORES

	Subject Total Flying Hours	
Risk Propensity Variable	Critical Value	Calculated P Value
Total Need (N) Score	.3013	.0664

Level of Significance = .05

CHAPTER V

SUMMARY, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Summary

Risk-taking has continued to interest researchers across a broad spectrum of specialties and has often been defined in a nearly endless variety of ways. Few studies, however, have addressed risk-taking as a problem within the aviation community and those which have, have primarily centered attention on risk-taking behavior among a relatively small sample size of subjects. The present study attempted to use the Risk-Taking-Attitude-Values Inventory developed by Carney (1976) to assess risk-taking propensity among a diverse population of pilots within a specific flying organization in Europe. A total of 29 subjects out of an accessible population of approximately 65 pilots responded to mailed requests for participation in this research. Subjects were asked to provide written responses to a study-specific Demographic Background Data Form, as well as, the Risk-Taking-Attitude-Values Inventory. Subjects were also given an opportunity to eliminate those questions which they perceived as too sensitive to answer. No subjects exercised this option. The nonparametric data resulting from this research were analyzed using a widely accepted correlational

technique to measure the degree of association between two variables on, or reduced to, the ordinal level.

Conclusions

The Spearman Rank Correlation method was used to determine the extent of association between the criterion variable of pilot propensity to take risk and the predictor variable of total number of pilot flying hours. Results indicate that no correlation was evident when the factor of total flying hours was compared to Masculine Aggressive Behavior (MAB) scores on the Risk-Taking Attitudes-Values Inventory (RTAVI). Additionally, no correlation was found when total flying hours were compared with Total Need (TN) scores. This analysis does not support other research findings (Atkinson (1957); Meyer, Walker and Litwin (1961); McClelland (1965), Murray (1984); Aero and Weiner (1985); Shwiel (1986); and Carney (1976)) which have linked risk-taking to high need, specifically the need for achievement. Additionally, no agreement can be found with the research of O'Hare (1990) which indicated a greater propensity for risk-taking in more experienced pilots.

On the basis of this analysis, and of the review of literature, the results of the present investigation indicate that (a) there is no evidence to support agreement that the factor of Need is a key element in the determination and measurement of risk-taking propensity; (b) pilots with greater total flying hours do not tend to demonstrate higher need and, thus, higher propensity for

risk-taking; (c) there is no evidence to support the suggestion that there are phases throughout a pilot's aviation career where propensity for risk-taking is either greater or lesser; and (d) there could be found no link between a pilot's propensity for risk-taking and his total number of aircraft flying hours.

Implications

The results of this type of research are important for aviation safety reasons in that continued research may help reveal periods of risk-prone behavior. These periods may then be translated into milestones which may serve to mark periods in a pilot's aviation career when he or she may pose a greater risk to self or others. This information could then be used by civil, military, or commercial aviation training specialists to develop awareness and flight safety education programs. Further research in this area may also demonstrate a benefit in the hiring of pilots with a specific level of experience over others based on their lower propensity for risk-taking behavior, or serve to alleviate this concern.

Recommendations

It is hoped that this research may provide valuable insight into the behavioral characteristics of pilots. Results of this project may also help fill some of the gaps in knowledge that now exist in the area of pilot risk management within the aviation behavioral science research community. Future research, as indicated by this initial study, should place greater emphasis on possible correlations between risk and other variables such as; chronological age, gender, military/civilian experience, type of aircraft flown, and single pilot versus crew cockpit differences. Comparisons and differences between pilots and non-pilots should also be investigated. Additionally, aviation-related testing instruments should be developed better to evaluate pilot risk-taking propensity. These could take the form of written test instruments which focus on cockpit management or the use of flight simulator scenarios to evaluate pilot reaction in risky situations.

Finally, the use of larger accessible populations for this research should be of primary consideration, as well as, those populations with widely dispersed demographic characteristics. Furthermore, investigations should ultimately aim to study this problem across the entire life-span of the pilot population.

REFERENCES

Aircraft Owners and Pilots Association. (1992). Aviation Statistics. AOPA's Aviation USA, 926.

American Psychological Association. (1963). Ethical Standards of Psychologists. In B. B. Wollmann (Ed.), Dictionary of Behavioral Science (pp. 471-476) New York: Van Nostrand Reinhold.

Ary, D., Jacobs, L. C., & Razavieh, A. (1985). Introduction to Research in Education (3rd ed.). Fort Worth: Holt, Rinehart and Winston.

Botwinick, J. (1966). Cautiousness in advanced age. Journal of Gerontology, 21, 347-353.

Botwinick, J. (1969). Disinclination to venture response vs. cautiousness in responding: Age differences. J. genet. Psychol., 115, 55-62.

Brockhaus, R. (1980). Risk taking propensity of entrepreneurs. The Academy of Management Journal, 23, 509-520.

Buros, O. K. (Ed.). (1978). The Eighth Mental Measurements Yearbook. (Vol.1). Highland Park, NJ: The Gryphon Press.

Carney, R. E. (1976). Risk-Taking Attitude-Values Inventory. La Mesa: Pennant Press.

Collins, R. L., (1981). Flying Safely (2nd ed.). New York: Delacorte Press.

Collins, R. L., (1992, February). Rewriting the rules: Are you good, bad, or ugly? AOPA Pilot, pp. 67-71.

Dunnette, M. (Ed.). (1983). Handbook of Industrial and Organizational Psychology. New York: John Wiley & Sons.

Federal Aviation Administration. (Undated). Human behavior: The no.1 cause of accidents (FAA Publication No. P-8740-38). Washington, DC: U.S. Government Printing Office.

Federal Aviation Regulation, § 61.5, (1990).

Guion, R. M., (1965). Personnel Testing. New York: McGraw-Hill.

Guralnik, D. B. (Ed.). (1987). Webster's New World Dictionary. New York: Warner Book, Inc.

Keyes, R., (1985). Chancing It: Why We Take Risks, Boston: Little, Brown and Company.

Kogan, N. & Wallach, M. A. (1967). Risk taking as a function of the situation, the personality, and the group. In New Directions in Psychology III. (pp. 111-278). New York: Holt, Rinehart and Winston.

Kogan, N. & Wallach, M. A. (1961). The effect of anxiety on relations between subjective age and caution in an older sample. In P. H. Hoch and J. Zubin (Eds.), Psychopathology of Aging. (pp. 123-135). New York: Grune and Stratton.

Kogan, N. & Wallach, M. A. (1964). Risk Taking: A Study in Cognition and Personality. New York: Holt, Rinehart and Winston.

Kogan, N. & Wallach, M. A. (1960). Certainty of judgement and the evaluation of risk. Psychol. Rep., 6, 207-213.

Luthans, F. (1985). Organizational Behavior. New York: McGraw-Hill.

Masters, R. & Gibbs, M. (1989). Risk-taking propensity of u. s. veterans: A comparative study. Journal of Political and Military Sociology, 17, 83-91.

O'Hare, D. (1990, July). Pilot's perception of risks and hazards in general aviation. Aviation, Space, & Environmental Medicine, 61(7), 599-603.

Parker, L. (1988, November 28). Aviation's forgotten frontier: Human frailty in the cockpit. Washington (D.C.) Post. No page cited.

Parker, L. (1988, January 22). Airlines urged not to pair green pilots: FAA advisory cites fatal denver crash. Washington (D.C.) Post. No page cited.

Schiff, B., (1992, February). The difference. AOPA Pilot, p. 97.

Sharp, V. F. (1982). How to Solve Statistical Problems with Your Pocket Calculator. Blue Ridge Summit: Tab Books, Inc.

Tongberg, S. A. (1970). Risk taking judgements in adulthood. Unpublished doctoral dissertation, The Pennsylvania State University, University Park.

Urquhart, J. & Heilmann, K. (1984). Risk Watch: The Odds of Life. New York: Facts on File Publications. p. xvi.

APPENDIXES

APPENDIX A

DEMOGRAPHIC BACKGROUND DATA FORM

DEMOGRAPHIC BACKGROUND DATA FORM

Age on last birthday_____.

Gender: (Check one) Male_____. Female _____.

Total number of fixed-wing flying hours _____.

Total flying experience. _____Years. _____Months.

Type of flying experience (check only one):

All civil_____.

All military_____.

Mostly civil_____.

Mostly military_____.

Nationality_____.

Language most frequently spoken at home_____.

PRIVACY ACT INFORMATION: The information requested on this form is necessary to determine specific background information and will be used for research purposes only.

APPENDIX B

RISK - TAKING - ATTITUDE - VALUE INVENTORY

BOOKLET NO._____
ADMINISTRATOR_____
ORGANIZATION_____
DATE_____ [] MALE [] FEMALE

RTAVI

(RISK-TAKING ATTITUDES-VALUES INVENTORY)

MATURE ADULT LEVEL

Answer Booklet

This booklet gives *you* a chance to say what you think about some things that people do. Almost everything a person does has some purpose and is directed toward some goal. Generally speaking a goal is something a person *needs* or *wants*. Some acts may help a person reach desired goals. Some acts may cause direct harm, while others may indirectly lead a person into trouble.

You can answer the questions in this booklet very quickly. There are no"right" or "wrong" answers. Simply decide which answer you think or believe is best and mark that place on the answer sheet.

Published by
Carney, Weedman and Associates
2130 Balboa Avenue/SanDiego,CA 92109

BACKGROUND INFORMATION

The questions on this page concern your general background. The purpose of these survey questions is not to establish your identity in any way or to learn anything in particular about *you*. This very general information is needed to establish the proper statistical category for the answers you give to the questions in this booklet.

CIRCLE THE NUMBER NEXT TO THE CORRECT ANSWER FOR EACH ITEM.

(1) My sex is: 1 (male) 2 (female)

(2) My age at my last birthday was between:

1	(30 - 39)	5	(55 - 59)	8	(70 - 74)
2	(40 - 44)	6	(60 - 64)	9	(75 - 79)
3	(45 - 49)	7	(65 - 69)	10	(80 or older)
4	(50 - 54)				

(3) My formal education (years of school) is:

1	(8 or less)	5	(2 years of college)
2	(9 - 11)	6	(3 years of college)
3	(12)	7	(4 years of college)
4	(1 year of college)	8	(5 or more years of college)

(4) The total yearly income of my family (all members living in the same home) is:

1	(under $3,000)	5	($15,000 - $19,999)
2	($3,000 to $7,499)	6	($20,000 - $29,999)
3	($7,500 - $9,999)	7	($30,000 - $39,999)
4	($10,000 - $14,999)	8	($40,000 or more)

(5) I attend church or other place of worship (on the average over the last year):

1	(never)	4	(occasionally)
2	(less than once a year)	5	(once a month)
3	(only on major holidays like Easter, Christmas, or Passover)	6	(two or three times a month)
		7	(weekly)

Proceed to Part I

PART I - VALUE GOALS

Some basic human goals("wants" and "needs") are listed below. Everybody at some time or other tries to reach one or more of these goals. Study each goal and its meaning until you understand all of them. The questions on the following pages are about these goals.

Goal	Meaning
A. AFFECTION	Giving and getting love and friendship; concern or caring about others and having others concerned or caring about you.
B. RESPECT	Admiring or looking up to people and having them admire and look up to you.
C. SKILL	Learning how to do things well and feeling that you can do them well.
D. ENLIGHTENMENT (Knowledge)	Understanding what things are and what they mean; being able to use what you know to do things you want to do. Having a chance to learn new things and giving the same chance to others.
E. POWER	Controlling your own behavior and being able to make your own choices; getting other people to do what you want them to do. Having a chance to be heard and to share in decisions about you made by others (family, friends, etc.)
F. WEALTH	Being able to buy the goods and services you want, such as clothes, entertainment, education, sports equipment, cars, retirement, etc.
G. WELL-BEING	Feeling happy and healthy; not feeling in need of anything; not being sick, worried, upset, unhappy, or depressed.
H. RECTITUDE (Responsibility)	Doing what is right; keeping promises; being honest, fair, and trustworthy. Accepting as your own and living by rules that protect the freedom, rights, opportunities, and property of everybody.

Proceed to next page

A. Importance of Goals

Some of the goals listed below may have greater value to you than others. Look at each goal. Ask yourself how important you feel each one is to *you*. (Meaning of the goals are on page 3.)

B. Nearness to Goals

Sometimes it is hard to reach an important goal. And sometimes it takes a long tome. Most people are some distance from reaching their goals. How close are *you* to reaching yours? For example, are you as wealthy as you want to be? Do you really have all the affection and respect that you want or need? If not, you may be some distance from reaching one or more of the goals listed.

FOR EACH GOAL LISTED BELOW, CIRCLE THE ANSWER (NO.1,2,3,4,OR 5) ON THE ANSWER SHEET THAT INDICATES HOW IMPORTANT THE GOAL IS TO YOU.

Use this scale for **Importance:** 1=Not important; 2=A little important; 3=Important; 4=Very important; 5=Most important.

1A. IMPORTANCE OF GOALS

GOAL*			NOT	LITTLE	IMPORT	VERY	MOST
(6) Affection	6	AFF	1	2	3	4	5
(7) Respect	7	RESP	1	2	3	4	5
(8) Skill	8	SKILL	1	2	3	4	5
(9) Enlightenment	9	ENL	1	2	3	4	5
(10) Power	10	POW	1	2	3	4	5
(11) Wealth	11	WEAL	1	2	3	4	5
(12) Well-Being	12	WELL	1	2	3	4	5
(13) Rectitude	13	RECT	1	2	3	4	5

Use this scale for **Nearness:** 1=Far from goal; 2=Quite a way from goal; 3=Half-way to goal; 4=Nearly to goal; 5=Reached goal.

1.B NEARNESS TO GOALS

GOAL*			FAR	QUITE A WAY	HALF WAY	NEAR	REACHED
(14) Affection	14	AFF	1	2	3	4	5
(15) Respect	15	RESP	1	2	3	4	5
(16) Skill	16	SKILL	1	2	3	4	5
(17) Enlightenment	17	ENL	1	2	3	4	5
(18) Power	18	POW	1	2	3	4	5
(19) Wealth	19	WEAL	1	2	3	4	5
(20) Well-Being	20	WELL	1	2	3	4	5
(21) Rectitude	21	RECT	1	2	3	4	5

*Having or getting enough of the items listed (affection, respect, skill, etc.).

PART II - UTILITY(USEFULNESS) OF BEHAVIOR

Listed below are a number of acts and behavior patterns that many people do. Some of the things listed may hurt or harm a person. Some may delay or even keep him from reaching his real goals. For example, one of them might make a person sick or unhappy. This would harm his *well-being*. Another might cause him to lose friends. This would cause him to lose *respect or affection*. Some of the acts or behavioral patterns listed might help a person get closer to his goals. For example, one of them might make him feel that he has gained skill. Another might lead to more *power*. Still another might make hime feel that he has more *responsibility*.

CIRCLE THE ANSWER THAT INDICATES HOW HARMFUL OR HELPFUL EACH LISTED BEHAVIOR WOULD BE FOR YOU.

PART III -EXPECTANCIES (CHANCE OF SUCCESS)

What if you wanted to do the things listed below?How likely would you be to succeed in doing them? Think of all the things that might block you, such as the police or other authorities, or lack of money, skills, or opportunity. Also, think of the things that could help you to succeed in doing some of these things, such as your abilities,or help that you might get from others.

CIRCLE THE ANSWERS THAT INDICATE HOW MUCH CHANCE OF SUCCESS YOU THINK YOU WOULD HAVE IN DOING THE THINGS LISTED BELOW.

Behavior		2. USEFULNESS OF BEHAVIOR: LIKELY HARMFUL	LIKELY HELPFUL					3. EXPECTANCIES OF BEHAVIOR: LITTLE CHANCE	SOME CHANCE	AVERAGE	BETTER CHANCE	VERY GOOD CHANCE	
		VERY HARMFUL	SOMEWHAT HARMFUL	HARMFUL AND HELPFUL EQUALLY	SOMEWHAT HELPFUL	VERY HELPFUL							
(22) Smoking cigarettes	22 SMOKE	1	2	3	4	5	47 SMOKE	1	2	3	4	5	
(23) Driving a car	23 DRIVE	1	2	3	4	5	48 DRIVE	1	2	3	4	5	
(24) Stealing or breaking things	24 STEAL	1	2	3	4	5	49 STEAL	1	2	3	4	5	
(25) Trying hard to do a good job.	25 JOB	1	2	3	4	5	50 JOB	1	2	3	4	5	
(26) Getting an abortion or helping a girl.	26 ABORT	1	2	3	4	5	51 ABORT	1	2	3	4	5	
(27) Going out to a movie, play, concert.	27 MOVIE	1	2	3	4	5	52 MOVIE	1	2	3	4	5	
(28) Using pills to change you mood.	28 PILLS	1	2	3	4	5	53 PILLS	1	2	3	4	5	
(29) Drinking alcohol until you feel it.	29 DRINK	1	2	3	4	5	54 DRINK	1	2	3	4	5	
(30) Protesting political or social probs.	30 DEMO	1	2	3	4	5	55 DEMO	1	2	3	4	5	
(31) Riding a motorcycle or small airplane.	31 MOTOR	1	2	3	4	5	56 MOTOR	1	2	3	4	5	
(32) Belonging to a group of friends.	32 GROUP	1	2	3	4	5	57 GROUP	1	2	3	4	5	

PART IV - WAYS OF CHANGING BEHAVIOR

Some people do things that are harmful to themselves and others. Stealing, fighting and using drugs are examples of such behavior. Even though it may seem desirable, changing the way a person acts is not easy. Counseling, school programs, and other efforts to help people change the way they act do not always work too well. Several methods that might have an effect on an individual's behavior are listed next.

CIRCLE THE ANSWERS THAT SHOW HOW HELPFUL OR HARMFUL YOU THINK THE ITEMS LISTED NEXT WOULD BE IN CHANGING YOUR BEHAVIOR.

Use this scale: 1=Not helpful; 2=A little helpful; 3=Helpful; 4=Very helpful; 5=Most helpful

Item

(72) Becoming involved in a club, team, or volunteer work

(73) Good example set for you by family, friends, and teachers

(74) Church programs

(75) Giving you interesting jobs and work

(76) Hearing about dangerous things on TV or radio

(77) Getting more love and understanding from your family

(78) Being accepted by your friends

(79) Having tougher laws and police enforcement

(80) Taking a course at school

(81) Getting help from a doctor or counselor

Proceed to Part V

4. WAYS OF CHANGING BEHAVIOR

		NOT	LITTLE	HELPFUL	VERY	MOST
72	CLUB	1	2	3	4	5
73	EXAMP	1	2	3	4	5
74	CHUR	1	2	3	4	5
75	WORK	1	2	3	4	5
76	TV	1	2	3	4	5
77	FAM	1	2	3	4	5
78	FRIEN	1	2	3	4	5
79	LAWS	1	2	3	4	5
80	COUR	1	2	3	4	5
81	DOCT	1	2	3	4	5

PART V - FREQUENCIES OF BEHAVIOR

Your answers to the questions on this page will be very helpful to us. You do not have to answer these questions unless you want to, but we hope you will. If you do answer, be as honest as possible. In your answer about drugs, do not list any drugs given to you by a doctor for illness, disease, or physical condition.

CIRCLE THE NUMBERS THAT BEST TELL YOUR EXPERIENCE

Use this scale: 1=I have never done this; 2=I did this a few (1-5) and quit; 3=I did this six or more times and quit; 4=I do this sometimes (less than once a week); 5=I do this regularly (more than once a week).

Behavior

(82) Smoking cigarettes

(83) Driving a car

(84) Stealing or breaking things

(85) Trying hard to do a good job in school or at work

(86) Getting an abortion(for men-helping a girl get an abortion)

(87) Going out to a movie, play, concert, etc.

(88) Using pills to change your mood or behavior

(89) Drinking alcohol until you feel its effects

(90) Protesting about political or social problems

(91) Riding on a motorcycle or in a small airplane

(92) Belonging to a group of close friends

(93) Avoiding contacts with others

(94) Hiking, bowling, tennis, or other active recreation

(95) Sexual intercourse with someone other than your spouse

(96) Fighting or agruing with someone

Thank you for you help

5. FREQUENCIES OF BEHAVIOR

		NEVER	FEW QUIT	6+ QUIT	SOME	REGULAR
82	SMOKE	1	2	3	4	5
83	DRIVE	1	2	3	4	5
84	STEAL	1	2	3	4	5
85	JOB	1	2	3	4	5
86	ABORT	1	2	3	4	5
87	MOVIE	1	2	3	4	5
88	PILLS	1	2	3	4	5
89	DRINK	1	2	3	4	5
90	DEMO	1	2	3	4	5
91	MOTOR	1	2	3	4	5
92	GROUP	1	2	3	4	5
93	AVOID	1	2	3	4	5
94	SPORTS	1	2	3	4	5
95	SEX	1	2	3	4	5
96	FIGHT	1	2	3	4	5
97	MARRY	1	2	3	4	5
98	POT	1	2	3	4	5
99	CHEAT	1	2	3	4	5
100	ALONE	1	2	3	4	5
101	MOVE	1	2	3	4	5
102	TV	1	2	3	4	5

DO NOT MARK ON THIS SECTION
FOR PROFESSIONAL USE ONLY

SDB STYLE U+E+F	**MAB STYLE** U+E+F	**SAB STYLE** U+E+F
7._____	2._____	20._____
17._____	10._____	21._____
Total 1 = _____ x 2 = _____	Total 1 = _____ x 2 = _____	23._____
		25._____
1._____		Total 1 = _____ x 2 = _____
3._____	6._____	
5._____	9._____	
8._____	13._____	4._____
12._____	15._____	11._____
14._____	19._____	13._____
15._____	22._____	16._____
18._____	Total 2 = _____	
24._____		
19._____	Sum = _____ =	Total 2 = _____
22._____	MAB Style Score	Sum = _____ =
Total 2 = _____		SAB Style Score
4._____		
25._____		
Total 3 = _____		
Total 1 x 2 = _____		
+ Total 2 = _____		
- Total 3 = _____		
Difference = _____ =		
SDB Style Score		

APPENDIX C

SUBJECT INVITATION LETTER

Lt Col G. Schnabel
OPS DIV/Exercise Br
Stop 7
B-7010 SHAPE

Dear Fellow Pilot:

I am writing to seek your assistance with a university research project. Specifically, I am looking for volunteers to participate in a study in which pilots are the main topic of interest.

For now, I am unable to give you more details as to the exact nature of this research, since that could possibly jeopardize the overall outcome of the study. However, I assure you that your participation will not expose you to either physical or emotional harm, and will simply involve your completing a survey of your attitudes and providing some additional background information. Total time for completion of these instruments will be about 30 minutes.

Naturally, all personal results or scores will be kept confidential with no possibility of scores or background information being associated with any individual. A summary of the overall findings, if any, will be made available following completion of the research project for anyone wishing to know the results.

If you do wish to participate please follow the instructions on the accompanying letter. If you choose not to participate, please return the consent form and inventory in the envelope provided. You may also contact me by telephone at (065) 44-4244 (Office) or (065) 31-4154 (Home) for additional information or instructions.

Thank you for your participation and assistance in this important aviation research project.

Sincerely,

Gilbert E. Schnabel

APPENDIX D

Research Instrument Instruction Letter

Lt Col G. Schnabel
OPS DIV/Exercise Br
Stop 7
B-7010 SHAPE

Dear Pilot:

Thank you once again for agreeing to complete the attached questionnaire. Please follow the instructions listed below when completing the accompanying forms:

1. Research Consent Form. Please complete and sign this form. If you wish to receive a summary of any significant findings resulting from this research project, please include your address in the spaces provided. Return this form to me separately and not in the same envelope provided for the return of the Risk-Taking Attitude Value Inventory (RTAVI). An address label is provided on the back of the Research Consent Form for this purpose.

2. Risk-Taking Attitude Value Inventory (RTAVI).

a.) General instructions for completing the RTAVI are provided on the front page of the document with additional instructions located within the blocks at the top of each page. Stapled to the inside front cover of the RTAVI you will find a Demographic Data Form to be used in place of the one provided. Please fill in this background information since it is necessary for statistical purposes and is of vital importance to the study.

b.) Each part of the RTAVI asks you to provide your feelings toward a goal or behavior. Your complete honesty is vitally important and encouraged. However, you may feel that a specific questions is too sensitive for you to answer. In this case, you may simply draw a line through that question. Please limit this option to no more than (two) questions, if possible.

c.) When you have completed the RTAVI, place it in the self-addressed envelope provided and forward it to me through the SHAPE distribution system.

Your cooperation in this valuable project is sincerely appreciated. If you have any questions or doubts about how to properly complete these forms, please call me at SHAPE extension 4244 or at my home (065-314154).

Very Truly Yours,

Gilbert E. Schnabel

APPENDIX E

RESEARCH CONSENT FORM

RESEARCH CONSENT FORM

I,_____(Please Print), agree, without reservation, to participate in a research project concerning the behavior of aircraft pilots. I understand that I will be asked to provide certain demographic information, solely for purposes directly related to this research, and will be required to complete a standardized attitude assessment instrument.

All information provided by me will be kept strictly confidential by the researcher with no possibility of my being identified with or connected to an individual assessment score or background data information form.

I further understand that this is a voluntary project and that I retain the right, at any time during the testing process, to no longer participate in this research project. In this case, I will be excused from the project and my assessment form and demographic background data information form will be destroyed.

Furthermore, I understand that I may, upon my request, receive a written summary of the results of this research project, and that this summary will be provided to me following final analysis and evaluation of all data by the researcher.

My signature below certifies understanding of my rights in connection with this research and acknowledges my consent to participate in this project.

Executed this_____day of_____, 19___, at SHAPE, Belgium.

_____

I (do)/(do not) request a summary of the final results of this research. My mailing address is:_____

_____

_____

_____

VITA

Gilbert Elgin Schnabel, Jr.

Candidate for the Degree of

Master of Science

Thesis: THE RELATIONSHIP BETWEEN PILOT PROPENSITY TO TAKE RISK AND TOTAL HOURS OF FLIGHT EXPERIENCE

Major Field: Occupational and Adult Education

Biographical:

Personal Data: Born in Morristown, New Jersey, February 14, 1948, the son of Gilbert E., Sr., and Mary Schnabel.

Education: Graduated from Boonton High School, Boonton, New Jersey, in June 1965; Received Bachelor of Education Degree in Health, Physical Education, and Recreation from University of Miami, Coral Gables, Florida in January 1970; completed requirements for the Master of Science Degree at Oklahoma State University in December, 1992.

Professional Experience: Lieutenant Colonel, United States Air Force; Supreme Headquarters Allied Powers Europe (SHAPE), Belgium, Project Officer, NATO Crisis Management Exercise Program, August 1991 - present; Chief, Aircrew Scheduling & Support Division, 379th Bombardment Wing, Wurtsmith AFB, Michigan, July 1988 - July 1992; B-52G Instructor Pilot, 379th Bombardment Wing, Wurtsmith AFB, Michigan, October 1986 - June 1988; Assistant Operations Officer, Instructor Mission Crew Commander, Chief of Mission Crew Training, 966th Airborne Warning & Control Training Squadron, Tinker AFB, Oklahoma, September 1983 - September 1986.