

RELATING PERSONALITY WITH STRESS COPING STRATEGIES
AMONG STUDENT PILOTS IN A COLLEGIATE FLIGHT TRAINING PROGRAM

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Aviation psychologists have long been interested in studying the personality characteristics of successful and safe pilots. To date, much of the research on pilot personality has involved the use of military aircrew. Few studies have examined the role of personality in civil aviation pilots' performance and stress coping during flight training. Therefore, little is known about the personality profiles of commercial and general aviation pilots, or the relationship between personality dimensions and the use of different strategies for dealing with flight-related stressors. Given the recurrent cutbacks in the U.S. military, an increasing number of commercial pilots in the U.S. are now being trained and recruited from the private sector rather than from the Armed Forces. Consequently, a better understanding of the personality profiles and stress coping strategies of pilots entering civil aviation training programs may help develop better selection, training, and safety programs for the civil aviation industry. To address these issues, we administered a personality test (Cattell, 1972) and a stress coping questionnaire (COPE) to first-year students ($n=50$) enrolled in the Professional Pilot Training program at the University of Illinois' Institute of Aviation. Results revealed that certain personality and stress-coping profiles of student pilots differed significantly from previously published norms within the population. Personality characteristics were differentially and significantly related to specific stress coping strategies adopted by student pilots. These findings support the notion that civil aviation pilots have different personality characteristics than non-pilots. In addition, they demonstrate that such differences can be associated with important stress coping strategies that may contribute to flight-training performance and success within civil aviation. Additional research is needed to increase the sample size used in this study and to track pilots' career performance long term.

Introduction

Intervention strategies to improve flight safety and prevent human error include the application of human factor principles to the design of cockpits, as well as to the development of better training procedures. However, aviation psychologists continue their long concern with studying the psychological or personality characteristics of successful and safe pilots as well. Personality is defined as "the characteristic way in which a person thinks, feels and behaves; the ingrained pattern of behavior that each person evolves, both consciously and unconsciously, as the style of life or way of being in adapting to the environment" (American Psychiatric Association, 1980).

The objectives of early personality studies centered on the identification of personality characteristics that might predict successful adaptation to military aeronautics for use in pilot selection. A consistent pattern of findings emerged from these studies, which described military pilots as more achievement oriented, outgoing, active, competitive, dominant and less introspective, emotional, sensitive, and self-effacing than their non-flying counterparts (Ashman & Telfer, 1983; Fine & Hartman, 1968). Within the broad category of military pilots, a subset has often been labeled as the "right stuff," who in addition to the above personality traits, tend to be the most

aggressive, dominant, exhibitionistic and self aggrandizing (Retzlaff & Gibertini, 1987).

Surprisingly, little empirical evidence supports the importance of pilot personality in pilot performance, despite the above characterization. Several studies failed to find a relationship between pilot personalities and success in pilot training programs. One of the most comprehensive early efforts to investigate personality measures for predicting aviation performance was conducted by the Army Air Forces Aviation Psychology program (Guilford, 1947). This effort sought to determine the predictive value of a number of commercially available tests. With very few exceptions, personality measures did not predict success in primary flight training. North and Griffin (1977) reviewed aviator selection research from 1917 to 1977 including a review of personality inventories. These authors found that approximately 40 different personality inventories and scales were used for pilot selection between 1950 and 1976, "without any appreciable impact on the selection of aviator candidates."

Given the inability of researchers to demonstrate the importance of pilot personality on flight training success, interest in personality within the aviation domain generally waned over the years. However, interest in pilot personality revived as some researchers began to find relationships between

aviators' personalities and stress coping strategies, as well as poor stress coping and pilot error mishaps. When compared to non-pilots, for example, military pilots appear more inclined towards active, problem-solving coping strategies and report a greater tendency to seek information from others in stressful situations. More importantly they tend to rely less upon emotional support, denial, avoidance or disengagement coping strategies in times of stress (Picano, 1990).

Maladaptive coping, may lead to errors and mishaps. For example, Alkov, Gaynor, and Borowsky (1985) found that those aviators labeled "acting out," as evidenced by their problems with interpersonal relationships and trouble with their superiors and peers, were more likely to be causally involved in their mishaps than those aviators who did not contribute. More of the aviator error group had recently undergone a personality change and were drinking to excess or had recently changed their drinking habits. All of these symptoms would appear to be the result of inadequate stress coping.

To date, much of the research on pilot personality has involved the use of military aircrew. Few studies have examined the role of personality on civil aviation pilots' performance and stress coping during flight training. Therefore, little is known about the personality profiles of commercial and general aviation pilots, or the relationship between personality dimensions and the use of different strategies for dealing with flight-related stressors. Indeed, there may be considerable differences between those pilots who are successful aviators in the military environment versus those who adapt or cope well within a civil aviation environment. For example, Ramachandran et al. (1983) using the Cattell 16 PF found that the personality profile of commercial aviation pilots differ from military pilots, particularly on dimensions of extraversion. However, no attempt was made to examine the relationship between personality types and stress coping.

Even less is known about the personality characteristics and stress coping strategies of general aviation pilots. Given the recurrent cutbacks in the U.S. military, an increasing number of commercial pilots in the U.S. are now being trained and recruited from the private sector rather than from the armed forces. Consequently, a better understanding of the personality profiles and stress coping strategies of pilots entering civil aviation training programs may help develop better selection, training, and safety programs for the civil aviation industry. The purpose of the present study, therefore, was to further explore

these issues by examining the relationship between personality and stress coping strategies among student pilots enrolled in a collegiate flight training program.

Method

Subjects and Procedure

The present study is a longitudinal study. The results of the first phase will be presented here. A total of 50 undergraduate students enrolled in the Professional Pilot Training program at University of Illinois' Institute of Aviation completed the first phase of this study. All participants were administered the Cattell's 16 PF test (Cattell, 1972) on the first day of their ground school at the beginning of the academic year. A stress coping strategy questionnaire (COPE, Carver, Scheier, & Weintrub, 1989) was then administered mid way through the semester, approximately eight weeks later. Both questionnaires were administered in a classroom setting. Students were informed about the purpose and objectives of the study and were assured that their participation or otherwise in the study would not influence their training program in any way.

Results

Personality Profiles

Table 1 presents students' personality scores along with normative data. Overall, student scores on the five global personality factors were within the normal range of 4-7 for all factors. However, student pilots generally scored higher on the extraversion ($M=6.14$, $SD=1.75$), tough mindedness ($M=6.4$, $SD=2.15$) and independence ($M=5.78$, $SD=1.84$) scales, but generally lower on the anxiety scale ($M=5.03$, $SD=1.88$), and self-control ($M=4.69$, $SD=1.59$), when compared to the general population. The differences were statistically significant for only self-control and tough mindedness.

Table 1. Means and Standard Deviations for the Five Personality Factors

| Personality Characteristic | 16 PF Norm | Student Pilots |
|----------------------------|-------------|----------------|
| Extraversion | 5.65 (1.87) | 6.14 (1.75) |
| Anxiety | 5.44 (2.14) | 5.03 (1.88) |
| Self-Control | 5.38 (1.94) | 4.69 (1.59)* |
| Independence | 5.66 (1.81) | 5.78 (1.84) |
| Tough-Mindedness | 5.63 (1.76) | 6.40 (2.15)* |

* Significant difference from development norm based on two-tailed z-test ($p<.05$).

Stress Coping

The COPE scale contained 53 items that made up a total of 13 different stress coping strategies. The reliability analysis of the COPE stress coping questionnaire was done using Chronbach's alpha. An alpha index of greater than 0.6 was obtained for all but two of the stress coping categories. Eight categories had an alpha of 0.7 or more, while five categories had an alpha of 0.8 or more suggesting a high degree of internal consistency of the questionnaire. Lower alphas (0.4415 and 0.4218) were observed for the categories of "active coping" and "suppression of competing activities."

Table 2 presents student pilots' coping strategies scores, along with normative data. Some differences were observed in the coping strategies adopted by the student pilots and those in the development sample of the questionnaire (the development sample consisted of 978 undergraduates from the University of Miami). The student pilots scored higher on behavior disengagement but lower on denial and mental disengagement. They also scored significantly lower on the more emotion-focused support seeking scales (seeking support-emotional and venting of emotions). Unexpectedly, they also scored lower in the problem-solving coping strategies. The two groups showed no significant difference in the tendency to turn to religion or the tendency to use alcohol/drugs as a coping strategy in times of stress (see Table 2).

Relationship Between Personality and Stress Coping

Pearson's correlation coefficients between personality factors and the stress coping categories were computed. All five global personality factors were correlated with at least one coping strategy. Extraversion was positively correlated with "seeking social support for instrument reasons" ($r=0.305$, $p<0.05$) whereas anxiety was correlated with alcohol-drug disengagement ($r=0.355$, $p<0.01$) and negatively correlated with positive reinterpretation and growth ($r=-0.333$, $p<0.05$). Tough mindedness showed negative correlation with "seeking social support for emotional reasons" ($r=-0.444$, $p<0.001$) and focus and venting of emotions ($r=-0.343$, $p<0.02$), whereas independence was negatively correlated with acceptance ($r=-0.325$, $p<0.02$), denial ($r=-0.285$, $p<0.05$), behavior disengagement ($r=-0.286$, $p<0.44$), and mental disengagement ($r=-0.438$, $p<0.001$). Self control was negatively correlated with seeking social support for emotional reasons ($r=-0.334$, $p<0.05$) and alcohol ($r=-0.305$, $p<0.05$), while positively correlated with religion ($r=0.38$, $p<0.01$).

Table 2. Means and Standard Deviations for the COPE.

| Coping Strategy | Development Sample (n=1030) | Student Pilots (n=50) |
|------------------------|-----------------------------|-----------------------|
| <u>Problem-Solving</u> | | |
| Active Coping | 11.89 (2.26) | 11.24 (1.88)* |
| Planning | 12.58 (2.66) | 11.82 (2.55)* |
| Suppression | 9.92 (2.42) | 9.50 (1.76) |
| <u>Support-Seeking</u> | | |
| Instrumental | 11.50 (2.88) | 11.44 (2.45) |
| Emotional | 11.01 (3.46) | 10.00 (3.16)* |
| Venting | 10.17 (3.08) | 9.10 (2.91)* |
| <u>Avoidance</u> | | |
| Denial | 6.07 (2.37) | 5.28 (1.87)* |
| Behavioral Diseng. | 6.11 (2.07) | 6.74 (2.51)* |
| Mental Diseng. | 9.66 (2.46) | 8.84 (2.54)* |
| <u>Acceptance</u> | | |
| Acceptance | 11.84 (2.56) | 11.22 (2.88) |
| Growth | 12.40 (2.42) | 11.82 (2.59) |
| Restraint | 10.28 (2.53) | 9.96 (2.07) |
| <u>Religion</u> | | |
| Religion | 8.82 (4.10) | 8.60(4.11) |
| <u>Alcohol</u> | | |
| Alcohol | 1.38 (0.75) | 1.36 (0.63) |

* Significant difference from development norm based on two-tailed z-test ($p<.05$).

Discussion

The personality profiles of the student aviators used in this study fell within the normal range of personality profiles of age-matched subjects within the population. Consequently, there does not appear to be any extreme attributes among these student pilots that are so often linked to pilot personality, especially in the military. However, our study suggests that student pilots have a tendency to be slightly more extraverted than the normal population. These findings are consistent with those of Ramachandran et al. (1983), as well as the findings of Siem and Murray (1994) who found conscientiousness was the most significant trait in pilots while extraversion was slightly elevated. In addition our pilots tended to be more tough minded yet less self controlled.

Similarities and differences appeared in our COPE results when compared to Picano (1990), who used the COPE to look at Army pilots, aircrew, and non-aviators. He concluded that, like Fine and Hartman,

pilots sought constructive solution oriented approaches to stress, while our pilots were lower on active coping and planning. He found that Army pilots scored low on avoidance (denial, disengagement) while our pilots scored low on denial and mental disengagement but higher on behavioral disengagement. Both COPE studies show similar results with low scores on emotion and venting scales, but no difference in religion or alcohol usage when compared to norms.

Stress coping strategies adopted by student pilots were correlated with various aspects of their personalities. While personality is considered a more stable, long-term characteristic, coping styles show greater malleability, and thus, opportunity for change. These opportunities mean instructors, supervisors, and counselors have numerous places to make improvements in student pilots coping choices via selection, training, and counseling. One should also consider that differences in coping strategies might effect more than performance. For example, coping style may affect self monitoring and the willingness to admit problems. Such insight could be valuable for teaching both aviation and stress coping skills to students, as well as improving aviation safety programs in general. However, further data collection will be performed to validate these findings using another group of student pilots, as well as to explore the relationship between personality and stress coping with pilots' grades at the end of their training program.

References

Alkov, R.A., Gaynor, J.A., & Borowsky, M.S. (1985). Pilot error as a symptom of inadequate stress coping. *Aviation Space & Environmental Medicine*, 56, 244-247.

American Psychiatric Association. (1980). *Diagnostic and statistical manual of mental disorders* (3rd ed.). Washington, DC: American Psychiatric Association.

Ashman, A., & Telfer, R. (1983). Personality profiles of pilots. *Aviation Space & Environmental Medicine*, 54(10), 940-943.

Carver, S.C., Scheier, F.M., & Weintrub, J.K. (1989). Assessing coping strategies: A theoretical based approach. *Journal of Personality and Social Psychology*, 56(2), 267-283.

Cattell, R.B. (1972). *Manual for the 16-PF*. Champaign, IL: Institute for Personality and Ability Testing.

Fine, P.M., & Hartman, B.O. (1968). *Psychiatric strengths and weaknesses of typical Air Force pilots* (SAM-TR-68-121). Brooks AFB, TX: USAF School of Aerospace Medicine.

Guilford, J.P. (1947). *Printed classification tests: Army Air Forces aviation psychology program research project* (Report no. 5). Washington, DC: U.S. Government Printing Press.

North, R.A., & Griffin, G.R. (1977) *Aviator selection 1919-1977* (NAMRL SR 77-2). Pensacola, FL: Naval Aerospace Medical Research Laboratory, Naval Air Station.

Picano, J.J. (1990). An empirical assessment of stress-coping styles in military pilots. *Aviation Space & Environmental Medicine*, 61, 356-360.

Ramachandran, N., Wadhawan, J.M., Kumar, V., Chandramohan, V., & Rao, P.L.N. (1983). Personality profile of an IAF Pilot: Its usefulness in pilot selection. *Aviation Medicine*, 21(2), 131-139.

Retzlaff, R.D., & Gibertini, M. (1987). Air Force pilot personality: Hard data on the right stuff. *Mult. Behav. Res.*, 22, 383-389.

Siem, F.M. & Murray, M.W. (1994). Personality factors affecting pilot combat performance: A preliminary investigation. *Aviat. Space Environ.*, 65(5, Suppl.), A45-48.