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STRESS COPING STRATEGIES FOR COMMERCIAL FLIGHT CREWMEMBERS

Willem J. Homan

ABSTRACT

This paper provides a selective examination of the current stress management literature and its practices. The author introduces strategies that can be utilized by commercial pilots to handle stressful events in the often-challenging flight environment and establishes a foundation for further empirical research in the area of human stress control in aviation settings. Stress management techniques adopted from sport psychology and management training programs are reviewed. First, stress and distress are defined and the physical, physiological, and emotional responses to stress are discussed. This is followed by an overview of the biology of stress. Next, traditional forms of stress avoidance are examined and the concept of stress hardiness is identified. A holistic management model, adapted to the aviation environment, is proposed to position stress resistance training within the context of the overall stress experience. Finally, a support program, the Air Line Pilots Association's Critical Incident Response Program, which assists commercial pilots who face emotional work-related traumas, is discussed.

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Nearly everyone in aviation has heard the expression "Flying is long hours of boredom interrupted by a few moments of stark terror." Challenging approaches, systems malfunctions, medical emergencies, and even hijackings can all turn an otherwise routine flight into a complete nightmare. Add organizational pressures like on-time arrivals, frustrating delays, company mergers, furloughs, and bankruptcies, and you begin to realize how stressful the airline environment really is. So, how should dedicated airline employees, and more specifically commercial pilots, deal with all this? Current interdisciplinary research in stress management may provide us with some useful answers. However, before we explore state-of-the-art methods on how to improve a pilot's performance under pressure, we must first place some of the stress research concepts in an aviation context.

HUMAN STRESS AND AVIATION SAFETY

Stress has always been part of our biological make-up and is essential to life. Actually, it is our natural "fight-or-flight" response, which is the body's ability to react instantly to a threat. When we perceive a danger, our body shifts into high gear and mobilizes for action. In fact, stress

creates the spark the body needs to boost performance. A key characteristic of stress is that it is self-imposed and it is the individual's reaction to the stressor that counts.

Reinhart (1996) identified some of the problems stressed-out pilots may encounter: distraction from tasks, preoccupation with insignificant problems, decision-making errors, technical errors, inattention to flight activities, rigid thinking, and a lack of situational awareness. Also, in numerous cases the mismanagement of a stressful situation resulted in an air disaster, as in the 1972 crash of Eastern 401, where an L-1011 aircraft slowly descended into the Florida Everglades while the three-man crew was distracted trying to solve a minor landing gear problem. Preoccupied and frustrated with the problem (which turned out to be nothing more than a burned-out landing gear indicator light), the crew fixated on the problem and forgot to fly the airplane. Ninety-nine people died in this preventable accident.

In another disaster, at Tenerife, Canary Islands in 1977, two B-747s collided on a take-off roll, killing 583 people. A very experienced KLM captain, Jacob Louis Veldhuyzen van Zanten, under enormous personal stress, was convinced he had received a take-off clearance, when he had not. Although a mix-up in communication was identified as the

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probable cause of the accident, the personal stress the captain experienced during the time preceding the accident was at the core of this tragic event. First, he had to deal with a diversion to Tenerife due to a terrorist bombing at the destination airport, Las Palmas. Then, his crew was running out of legal duty time, a very serious violation in his home country, the Netherlands. Moreover, Captain van Zanten held two positions within his airline: the Director of Flight Training (i.e., management) and a line pilot, and wearing two company hats tends to result in very complicated decision-making. Next, he was frustrated with a minor hydraulic problem and a time-consuming refueling at an unfamiliar airport. This refueling resulted in yet another problem; his KLM aircraft, parked on the tarmac, blocked a PanAm B-747 from leaving. Added to this was a lack of clear communication between Spanish air traffic control and the KLM flight crew, which further aggravated the situation. Clearly, the cumulative stress this frustrated captain must have experienced was horrendous, greatly influencing his decision making process.

DEFINING AND CATEGORIZING STRESS

The concept of stress means different things to different people. Although its effects are relatively well defined, stress itself remains a rather illusive concept that can be explained in many different ways. For the purpose of this paper I will accept the Miller and Smith (1993) definition: "Stress is the state of dynamic tension created when you respond to perceived demands and pressures from outside and from within yourself." It is important to understand that both internal and external stressors, real or imagined, can cause stress. Along the same lines, the term distress can be viewed as a state of physical or mental suffering. This is the actual strain on our system that results from dealing with stressors and can occur when any event triggers a stressful reaction. For example, getting stuck in traffic when the flight leaves in an hour is enough of a stressor to raise a pilot's anxiety and frustration level.

Actually, crewmembers may encounter three types of stress in the airline flight environment. First, physical stress results from environmental conditions, such as conducting a pre-flight in sub-zero temperatures. Second, physiological stress involves stressors like jet lag or the lack of physical exercise. Third, emotional stress concerns stressors that can be divided into psychological (e.g., flight planning under severe time constraints) and psychosocial (e.g., arguments with other flight crewmembers or family members) elements. Surely, many of these stressors affect

aviators everyday, but their effects (positive or negative) will vary depending on the personal perception of each individual. Also, it is important to note that our body does not distinguish between different types of stress. Mental demands trigger the same reactions as physical demands. Nightmares, for example, are just as real to our body and mind as any ordeal you may encounter at work. Furthermore, unless an acute stress attack is neutralized, it can turn into a chronic condition. Acute stress injects adrenaline into the bloodstream and becomes a source of energy. Heartbeat, breathing rate, and blood sugar levels all increase. As previously mentioned, the body enters a "fight-or-flight" mode, which enables the individual to react quickly to the situation. However, chronic stress is the most difficult form of stress to deal with, because it tends to exaggerate the multiple effects of cumulative acute stress. In fact, long-term chronic stress has been known to cause irritability, high blood pressure, insomnia, ulcers, and heart disease. If not handled properly, this type of stress will threaten an individual's health.

While positive stress can be a source of energy, negative stress can be very debilitating. Just as the expression "I work best under pressure" implies sharpened mental alertness, the statement "I am all stressed-out" means that stress levels have become counterproductive. A feeling of being "bored to tears" is also counterproductive. Except at some optimal level, stress will lead to poor judgment, inattention, and faulty decision-making. So, how much stress is required?

Psychologists Yerkes and Dodson (1908) devised an inverted U-shaped function (Figure 1) which reveals that human performance increases with arousal (i.e., stress level) up to a point. At this ideal point, the individual should be able to reach peak performance. Increasing the stress level further will result in a deterioration of performance. Moreover, since stress builds up over time, its negative effects on performance will further erode the pilot's ability to deal with complex or difficult tasks. Either under- or overstimulation has the potential to increase human error on the flight line. Crewmembers do require a certain level of stress to maintain top performance. The amount of stress that is required depends on the individual's needs and has a direct effect on pilot performance and situational awareness (Homan & Sandel, 1999).

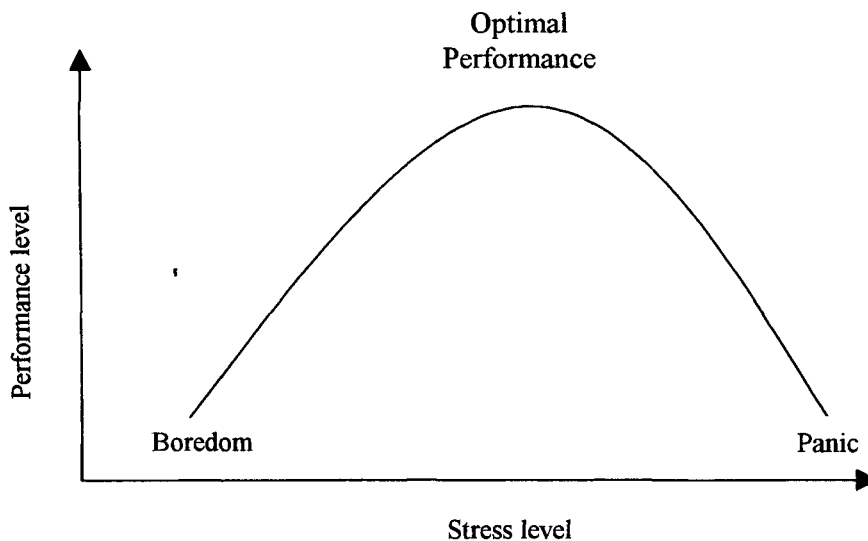


Figure 1. The Yerkes-Dodson Model.

THE EFFECTS OF PERSONALITY

Certain personalities are more prone to develop stress-related illnesses than others. These are referred to as “Type A” and tend to be individuals who always want to compete. Ambition and performance are very important to them and, as a result, they have difficulty relaxing. On the other hand, “Type B” refers to those individuals who don’t like to compete, are more patient, and tend to take life as it comes. Because Type A personalities like to aggressively take on the world, they tend to exhibit hazardous attitudes like macho, anti-authority, impulsivity, and invulnerability (Trollip & Jensen, 1991). This kind of behavior can lead to very frustrating and often dangerous situations.

THE BIOLOGY OF STRESS

Stressful events trigger the sympathetic nervous system, the part of the autonomic nervous system that controls such things as circulation and respiration. This activates the body’s defense mechanisms in a reaction called the “fight-or-flight” response.

The brain, through electrochemical impulses, stimulates

the kidneys, which in turn release two sets of hormones. First, there are the glucocorticoids, which break down organic material into more basic elements and elevate sugar, fat, and cholesterol levels in the blood. Similar hormones increase stomach acidity levels to prepare the body for rapid digestive functions and suppress the immune system to avoid allergic reactions when the body mobilizes for the “fight-or-flight” response. The other set of hormones involves the adrenaline-type that mobilizes the body by increasing the heart rate and constricting the arteries. The result is an elevated blood pressure, increased oxygen consumption and a faster breathing rate. At the same time, the individual’s thought processes shift into high gear and the body is ready for action.

All this puts a major strain on the body and when the energy produced by the “fight-or-flight” response has nowhere to go you get into trouble. Societal limitations, for example, can aggravate the impact of stressors. You can’t physically fight your adversaries when they cause you stress. For instance, you can’t beat up an unruly passenger on one of your flights, it is simply socially unacceptable.

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Likewise, you can't always flee stress. For example, you don't just walk away when a seriously ill family member causes you a lot of stress.

The longer our body is strained the greater the likelihood of a major failure. Sustained high levels of blood pressure, heart rate, and cholesterol put excess pressure on the circulatory system, a lowered immune reaction leaves the body susceptible to infection, and a mind preoccupied with extreme emotions undermines clear thinking (Maddi & Kobasa, 1984). When this pressure on the system continues stressed-out individuals may develop an ulcer, a heart attack, or a nervous breakdown. If the body's mobilization is prolonged enough and the intensity remains high, several breakdowns may occur, resulting in a major systems malfunction (Selye, 1980).

For the purpose of this article two hormones deserve special attention. One is epinephrine, or more commonly called adrenaline. Epinephrine (and the associated norepinephrine) is produced by the adrenal medulla and plays a key role in positive arousal. This hormone is released when one faces a challenge and is associated with feelings of alertness and concentration. Another hormone, belonging to the glucocorticoid family, is cortisol. Better known as hydrocortisone, this hormone is produced by the adrenal cortex, is linked to negative arousal, and produces feelings like fear and tension. It is one of the main hormones responsible for the suppression of the immune system and it is also known to slow healing after an injury. Cortisol is the type of hormone that is released when one faces a threat (Loehr, 1986). One study clearly illustrates this mind/body connection. In 1996, Farrace and colleagues hypothesized that flight instructors would experience training flights as a manageable challenge, whereas the trainees would experience the training flights as a potential threat. After exposure to the training flight, the trainees showed increased cortisol, growth hormone, and prolactin – a typical stress response – whereas the experienced flight instructors showed only an increase in growth hormone, but not of cortisol. This shows that high cortisol levels (with or without high growth hormone) constitute a negative stress response, whereas growth hormone alone (which is known to increase healing after an injury), without the adverse effects of cortisol, offers the potential for growth and increased health.

TRADITIONAL STRESS AVOIDANCE AND COPING

To manage stress, we first need to identify the source and

the magnitude of the stressful situation. Listen to your emotions and try not to block the incoming stressful feelings. Pilots have a tendency to ignore emotions and feelings. This is a result of the aviation macho culture, in which everyone is expected to be strong-willed and determined and where nobody talks about emotional issues. Emotions, however, are basically mind/body talk, providing you with very valuable messages. In a way, they are the instrument gauges that tell you what your internal situation is. Think of feelings and emotions as flight data from your Flight Management System that is guiding you through life. A prerequisite to commanding your feelings is to become sensitive to your emotional impulses (Loehr, 1986). Next, take a rational look at the stressor(s) and work your way through the following checklist:

1. Is my mind working to lessen or increase my stress level?
2. What is the reality of the situation?
3. What is the very worst thing that is likely to happen to me?
4. Am I overreacting to the problem?
5. Can I change the situation for a positive outcome?
6. If I cannot, what is the best way to cope with it?
7. Has this ever happened to me before?
8. If so, what did I do and what can I do better?
9. If not, then what is the best rational plan?

Answering these important questions will alleviate many of the stressful feelings that may result from a hectic aviation life style.

Research psychologists do recommend several different stress-coping strategies for flight crewmembers, including relaxation techniques, deep concentration, and biofeedback systems. An analysis by Douglas (1990) revealed that progressive muscle relaxation techniques might offer the best starting point for pilots to reduce stress. In general, progressive muscle relaxation involves tensing individual sets of muscles, then consciously relaxing them. The overall effect is to reduce muscle tension. This technique allows you to focus on something other than the original stressor, helps you break the stress cycle, and provides you with positive feedback.

Another method often recommended is breathing control. This approach also breaks the stress cycle and gives the pilot practice in recognizing when he's not breathing regularly. Here the focus is on deep breathing from the bottom of your lungs. Transport Canada recommends the

following routine:

1. Sit down, preferably in a comfortable chair.
2. If your circumstances allow you to close your eyes, do so.
3. Breathe in slowly through your nose, using your diaphragm to inhale.
4. Hold your breath for a count of three—"one thousand one, one thousand two, one thousand three."
5. Let your breath out slowly through the nose.
6. Repeat the cycle as long as you need to.

When performed properly, this technique will help you relax and refocus. It not only lowers your heart rate and blood pressure, but also breaks the stress cycle and helps you put things into perspective.

However, the timing of when to use these relaxation techniques is critical for their effectiveness. For instance, using mental relaxation techniques immediately before a performance (i.e., flight check) can be detrimental. When you are too relaxed, you become emotionally flat and uninspired when it's time to perform. In one research project (Manyande et al., 1992), physicians studied surgery patients and relaxation training aimed at decreasing preoperative and postoperative distress. One group of patients received pre-surgery relaxation training; a control group did not. The results were surprising and suggested that preoperative relaxation actually increased the stressfulness of the surgery. This indicates that some negative emotions (anxiety) often play a vital role in preparing us for an upcoming performance.

Obviously, any of these techniques can be effective if you train well before you face the truly stressful emergencies. Pilots should hone stress management skills in the same way they practice their landing skills. Don't experiment on the day you face a real emergency, but practice on the more mundane events in your daily life. Also, when the stressful situation is not related to an emergency, apply the more common approach to stress management: stress avoidance. Forget about time pressures and productivity and find satisfaction in just being, without striving. Find activities that give you pleasure and are good for your mental and physical well being. However, when the stress in your pilot's life becomes excessive, you may find it beneficial to see a health counselor who can instruct you in the use of some of the above-mentioned relaxation techniques. Finally, the Crew Resource Management (CRM) literature offers some suggestions for reducing interpersonal stress in a cockpit setting: Open the lines of communication, be

assertiveness, use humor, move on, and involve your crewmembers in the decision-making process.

HARDINESS OR THE ART OF TOUGHENING UP

There is, however, a different strategy for dealing with stress. A meta-analysis of stress research conducted in the 1970s showed that, although the effects of stress on the body were clearly defined, the actual link between major stress events and illness was rather weak when the researchers looked at the total numbers (Rabkin & Struening, 1976). So, were the effects of stress overrated? Or was there something else going on? Experts knew that personal perception influences the effects stress has on the body and that each individual deals with stressors in his or her own way. They also knew that some individuals thrive on stress while others avoid it like the plague. Researchers found that the subjects who thrived on stress tended to possess certain buffers or resistance sources that others didn't have. Psychologists call it "hardiness," referring to a personality style that shows commitment, control, and challenge. In sport psychology and the military academy, the concept is often referred to as "psychological thriving" or "toughening up." *Toughening* is a term first applied to rats who became more hardy after being exposed to stressors (Miller, 1980).

To some degree, the hardiness concept is similar to the art of bodybuilding, where athletes first break down the different muscle groups by stressing them to the extreme, and then, after a period of recovery, focus on rebuilding the muscles to an even greater strength level. In rats, toughening or hardiness is directly related to mortality. Daily exposures to mild stress increased rats' average life span by 18% (Frolkis, 1981). In humans, Belloc and Breslow (1972) determined that middle-aged men whose lifestyle made them handle stress more effectively (hardy individuals) added about 11 years to their lives. For women, the health benefit of effective coping and handling stress was about 7 years. Thus, it appears that intermittent exposure to stressors, with recovery time before facing additional stressors, may actually make an individual more resistant to future stressors. In fact, many of these studies have been used as an argument for exposing children to brief, manageable stressors rather than sheltering them. However, probably the most obvious example of hardiness training is "boot camp" for military recruits, where candidates are required to perform at maximal levels within a well-defined team setting.

Today, many researchers consider the concept of

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hardiness one of the foundations of stress management, and several techniques have been developed to assist the average person in reaching higher levels of stress resistance. As we will see, physical toughness training requires a focus on both nutrition and exercise and is actually quite straightforward. For mental toughness training, the process may become a little more complicated, and a session with a stress counselor may be advisable.

KOBASA'S STRESS RESISTANCE MODEL

Before discussing the different accepts of stress resistance training, it is helpful to position the toughness/hardiness concept within the overall stress experience. A review of the Kobasa Stress Resistance Model (1979) (Figure 2) is very useful here. Some readers may argue that the Kobasa model is somewhat dated and that more elaborate (and precise) models have been developed. This may be true; however, the beauty of this model lies in its simplicity and the fact that numerous professional stress counselors are

still using it. Then there is the question of the adaptability of the Kobasa model and its theories to the aviation industry. The theories and suggested practices associated with the Kobasa model resulted from extensive longitudinal research involving middle level managers at the Illinois Bell Telephone company in the late seventies and early eighties (Maddi & Kobasa, 1984). These were very stressful times characterized by market shifts, labor issues, consumer pressures, and organizational change. Clearly, there are some striking similarities between what occurred at Illinois Bell and what is happening at many of our airlines today.

The main hypothesis in this model is that stressful life events (failed flight check, job loss, close call, etc.) result in physical, physiological, and emotional strain (identified by observing the "fight-or-flight" response), which then can lead to major physical breakdowns and illnesses. Clearly, one element that has a direct effect on strain is our physical make-up.

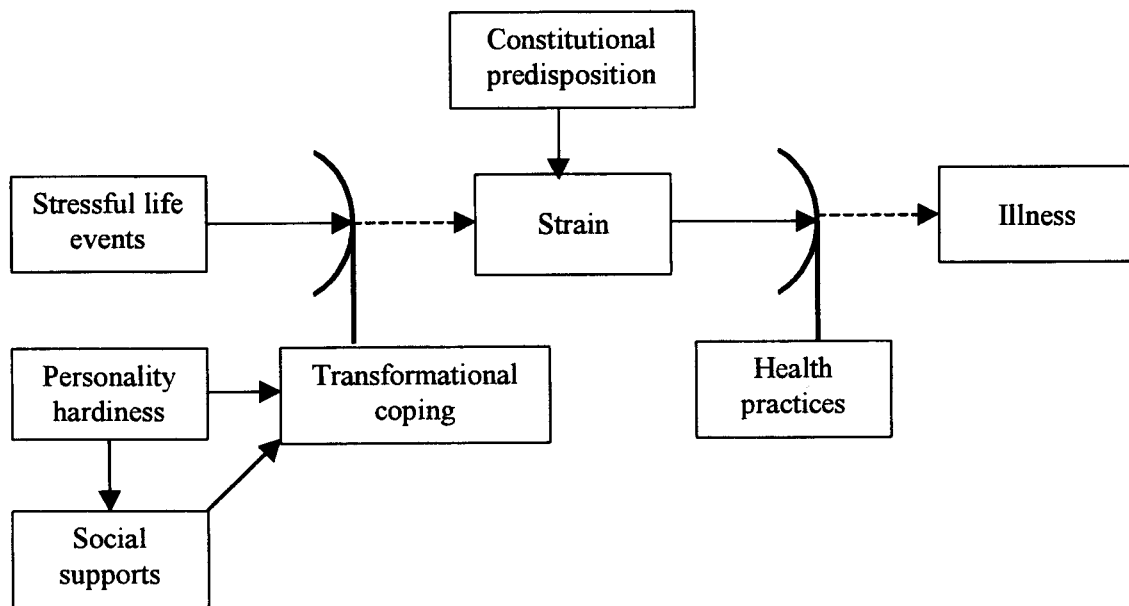


Figure 2. The Kobasa Stress Resistance Model.

Constitutional Predisposition

The stronger our physique (general anatomy, circulatory system, etc.), the less strain will result from continued stress exposure, and therefore the less likely we will acquire any stress-related illnesses. Related to this are health practices that have a buffering effect (as shown by the arc) when strain is experienced.

Health Practices

Exercise and nutrition are a case in point here and require a more detailed discussion.

Managing Stress Through Exercise

Exercise is by far the best tranquilizer for stressful situations, and it does amazing things to our body. Exercise increases catecholamine production, a class of compounds that include the hormones epinephrine and norepinephrine, which are produced by the adrenal gland above the kidneys. These hormones play an important role in the physical recovery from stressful experiences. Furthermore, exercise leads to biochemical changes in the brain, altering its chemistry and serving as an antidepressant. Studies have shown that exercise is a better antidepressant than relaxation and enjoyable activities. In fact, exercise has been shown to be as effective in decreasing stress-related depression as many forms of psychotherapy (Barclay, 2001). It is also known that when you exercise, positive changes occur in three neurotransmitters—serotonin, dopamine, and again, norepinephrine. These substances transmit nerve impulses across the synapses in the brain. Recent studies involving neurotransmitters show that chronically exercised rats improve emotionally because the exercise raises their brain norepinephrine levels. So, with overwhelming evidence that regular exercise fights stress, what kind of exercise is best? The American Council on Exercise recommends the following for managing stress:

1. Write your exercise time on your calendar. In doing so, you are already beginning to reduce stress.
2. Ideally plan a 10-minute exercise break every 90 minutes. Walk, stretch, climb stairs—anything that makes you move your body.
3. Plan on a daily program of at least 20 minutes of aerobic exercise. Stress management requires more frequent activity than fitness training does.

4. Vary your activities every day to avoid boredom.

5. Learn relaxation techniques like yoga.

6. Get involved in competitive sports like tennis, racquetball, or squash to cleanse the body of stress-producing hormones like adrenaline.

Some experts (Loehr & Schwartz, 2001) recommend interval training over steady-state training. This means that you should focus on anaerobic exercise routines rather than aerobic. With aerobic exercise (walking, swimming, bike riding), you never “run out of breath” and you raise your heart and breathing rate only to about 70% of its maximum level. With anaerobic exercise (weight lifting), you do “push the envelope” and “run out of breath,” thereby challenging the cardiovascular system (FAA, 1997). It is an exercise routine that is cyclical and involves great energy expenditures, followed by well-defined periods of recovery (rest). Many researchers suggest anaerobic exercise because it increases the overall strength and flexibility of our cardiovascular system. The ideal length of an anaerobic exercise routine is 20-30 minutes, and it should involve numerous cycles of energy expenditure (stress) and energy recovery (rest). Interval training is the cornerstone of many toughness-training programs and requires initial guidance by a health professional. In fact, before starting on any interval training program, you should get a thorough medical examine, start slowly, use low-impact and soft-surface exercises, focus on a different muscle groups each day, and follow a consistent program. Also, even though weight lifting appears to be one of the more common forms of strength training, you should use different kinds of exercise (tennis, cycling, etc.) to add variety to your fitness program.

Research conducted by Hoffman (1999) and colleagues indicates that physical fitness has a positive influence on the success rate of pilot candidates, who are applying to the Israel Air Force academy. In this study, all candidates (applying for both fighter and transport category flight positions) had passed preliminary psychological and medical examinations. However, successful candidates had a higher aerobic capacity, anaerobic power output relative to body weight and lower percent body fat than unsuccessful candidates. This study complements existing reports that physical fitness improves pilot performance.

Stress Coping Strategies

Stress Management and Nutrition

“Everyone stops fighting when blood sugar levels drop to a certain point” is an expression often used in sports medicine. This also holds true for the world of flight, where many pilots put in long hours and deal with stress, fatigue, and a lack of valuable nutrition on a regular basis. Think of irregular meal schedules, airport junk food, and the daily coffee-and-donut routine, and you begin to understand why, at times, blood sugar levels may hit rock-bottom and the ability to manage stressful situations diminishes as well. To enhance their capacity to handle stress and to avoid low blood sugar levels, pilots should eat something every 2 hours. Some experts even suggest that individuals should avoid the standard three-meals-a-day routine when they are on the job. This approach protects you from any low blood sugar level between meals. Also, avoid simple sugars prevalent in foods like candy bars, doughnuts, and soft drinks, which spike your blood sugar level and put you on a roller coaster. The problem is that simple sugars, a human invention, reach the bloodstream much too quickly and cause the pancreas to overreact and release so much insulin into your system that the overall blood sugar level actually goes down. Therefore, pilots should rely on complex sugars found in natural foods, which have lower conversion rates, to meet their sugar needs.

The importance of a high quality food intake cannot be underscored. The American Cancer Society states, “Scientific evidence suggests that about one-third of cancer deaths that occur each year in the United States can be attributed to nutritional factors.” Thus, the value of good nutrition is clear, but how do we increase energy levels? First, the food we eat to boost energy should meet our carbohydrate intake requirements (fruits, vegetables, grains, rice, and potatoes). At least 65% of our daily calories should come from carbohydrates, which convert to glucose in the blood and to glycogen in the muscles and liver. Next, protein (milk, meat, fish, eggs, etc.), provides a source of long-term energy. Daily intake of protein should be around 15%. However, the combination of certain carbohydrates and protein can make you sleepy, which you should be aware of on long flights. Finally, there is fat intake, which tends to be about 15% a day. Although essential, fat itself doesn’t provide you with a quick boost of energy or an immediate increase in stress resistance levels. It takes time to digest and makes you feel sluggish (Loehr, 1986). So, what should pilots do? They should eat several small, nutritious meals each day with a few snacks in between.

When under a lot of stress, it is also advisable to take vitamin C supplements, because vitamin C is known to rid the body of adrenaline. As for a break-time snack, a high-performance energy bar and some low-fat milk may give you just the short-term boost you need to stay alert and to prepare yourself for the next stressful event (Homan & Sandel, 1999).

Another area of nutrition is hydration. Dehydration is an environmental stressor that is very common among pilots, resulting in numerous cases of kidney stones each year. The bone-dry pressurized cabin environment pilots operate in and the fact that many of them drink regular coffee on the flight deck to stay alert cause dehydration. Coffee, just like tea and cola, is a diuretic or a substance that tends to increase the flow of urine. Flight crewmembers therefore become dehydrated and must make a conscious effort to drink plenty of fluids, preferably water or fruit juice, to stay in top shape (Reinhart, 1996). Finally, stress-related alcohol consumption is often observed when individuals go through a difficult time in their lives and are looking for ways to relax and escape the stressful environment. Given the nature of the pilot’s job and the effects of alcohol on flight performance, it is clear that this form of stress coping is dangerous and completely unacceptable.

Health practices, like regular exercise and proper nutrition, offer an effective buffer against the negative effects (illnesses) that strain may bring about as a result of stressful experiences. With training and persistence, however, aviators can learn to control the body stress experience.

Transformational Coping

Another stress resistance buffer operates at a different point on the stressful events-strain-illness axis. Kobasa (1979) identified this buffer as “transformational coping,” when the individual tries to alter the perception of the event that is causing the stress through positive and creative thinking and by putting the entire stressful experience in perspective. The effects of transformational coping depend on two factors: the level of personality hardiness of the individual and the social support provided by the group the individual is working with.

Personal Hardiness

Kobasa (1979) defined three characteristics of what she called the “hardy personality.” Individuals who possess these characteristics respond to stressful events in a more effective way than those who do not demonstrate these

personality characteristics.

1. **Commitment:** Individuals exhibiting commitment take a positive and active approach to any stressful event that comes their way. In a demanding work environment, they see themselves as team members who are focused on solving the problems of the group. This is very different from individuals who don't feel part of a team, who have an attitude of resignation, and who alienate themselves from the group.

2. **Challenge:** Individuals who possess this quality believe that change is a constant in their life. Hardy individuals tend to see change and crisis as challenges to confront rather than threats to avoid. This mindset is critical to increasing hardiness. As mentioned earlier, pilots who exhibit this healthy challenge response tend to have higher epinephrine levels and lower cortisol levels in their bloodstream.

3. **Control:** Instead of feeling a sense of powerlessness, these individuals have a feeling of control or even ownership over the situation. They tend to focus their energy on those events they can control rather than on situations beyond their control. They believe they are active participants and have control over their own destiny. One example takes us back to World War II, where allied co-pilots, who were along for the ride, but not in control of their bombing missions, were more likely to break down from stress than the pilots. Therefore, individuals that experience the greatest stress are those who have high demands placed on them, but who have little control over their jobs.

Again, individuals who possess the hardiness characteristics tend to perceive stressful life events as a challenge rather than a threat. Applying commitment, challenge, and control they mentally transform stressors to something manageable, and thereby decrease the overall strain (the "fight-or-flight" response) experience on their body. Although personality hardiness or toughness may come easier to individuals with high self-esteem it is a mindset that can be learned. Of course, it is often difficult to change the way we perceive life events and the emotional state that is associated with it. We can, however, exercise considerable control over what we do with our physical bodies as well as our mental processes. As sport psychologist, James Loehr points out, physical toughness training, together with mental toughness training, produces emotional toughness that allows the individual to develop

the challenge response. In fact, Loehr and his colleagues have used the hardiness concept in many of their training programs to assist world-class athletes in achieving peak performance. However, the main focus of their research has centered on the stress recovery phase rather than on the actual exposure to different stressors (Loehr, & Schwartz, 2001). It appears that athletes who thrive on stress and achieve peak performance have somehow adopted a more efficient way of recovery from stressful events than less accomplished athletes. The researchers premise is that energy recovery as a result of stress is as important as expending it. Finally, stress expert Dienstbier (1989) commented on the overall effect of hardiness as follows: "A challenge orientation toward tasks may increase sympathetic reactivity, which increases glucose availability, which in turn enhances performance and ability to cope. In this way, experiencing success from stressors may create a positive cycle of seeking further stressors (viewed as challenges) and benefiting from them." Obviously, we all have the ability to see our daily stressors in a different light and may even learn to develop ways to thrive on stress.

Social Supports

The second factor affecting transformational coping involves social support by fellow crewmembers. Over the years, Crew Resource Management (CRM) experts have adopted many concepts and ideas from corporate management training programs and applied them to the cockpit and the aviation organization as a whole. CRM has been defined as the effective utilization of all available resources to achieve safe, efficient flight operations. Resources include autopilots and operating manuals, but also people, such as crewmembers, air traffic controllers, and others in the flight system (Wiener, Kanki, & Helmreich, 1993). In CRM, the importance of communication and interpersonal skills in the context of teamwork is the key to the successful operation of a flight deck. CRM focuses on members' attitudes and behaviors, and effective CRM involves the entire flight crew. Kobasa (1979) states that social support can greatly influence the stress coping style of the individual, referring to the know-how and resources that result from associating with knowledgeable people. Clearly, when CRM is practiced appropriately, and other crewmembers support the stressed-out pilot emotionally, the overall effect on stress management will be positive and transformational coping of the individual will be increased (Driskell & Salas, 1996).

THE CRITICAL INCIDENT RESPONSE PROGRAM

Commercial pilots normally do not face the same kind of stressful events that military aviators expect to encounter in their careers. However, civilian pilots can still find themselves in very precarious situations with possible catastrophic results. Anything from major systems failures to medical emergencies and, yes, even hijackings come to mind. When these situations get out of hand, they affect the crewmembers so profoundly that some of them develop a condition called post-traumatic stress disorder (PTSD). PTSD results from exposure to an extreme traumatic stressor and/or the witnessing of events, such as death and injury. A good example here is the Aloha Airlines incident that occurred in Hawaii in 1988. Although the flight crew was able to land a severely damaged Boeing 737 (the roof came off) and managed to save numerous lives, the pilots lived with the emotional trauma of the accident for many years. As a result, the co-pilot on that flight, Captain Mimi Tompkins, approached the Air Line Pilots Association Executive Board to establish a Critical Incident Response Program (CIRP) for flight crewmembers.

The purpose of this program is to educate commercial pilots about critical incidence stress and to help prevent the development of PTSD following an incident or accident. ALPA's program instructs pilots in stress reduction and coping strategies to help them reduce the effects of psychological trauma (Tompkins, 1995). Today, most airlines offer CIRP training for their flight crews. However, given the general reluctance of pilots to consult psychologists, the program is set up with peer volunteers (i.e., other pilots) who are trained in intervention techniques like traumatic stress management and family support. Depending on the severity of the incident or accident a CIRP will involve either a one or two step approach. The first step in an actual intervention after an incident / accident is to defuse the situation by explaining to the traumatized crew member what he or she can expect and suggesting ways to better cope emotionally with the situation. A peer volunteer conducts this 30 minute session, either by phone or in person, within one day of the incident / accident. The briefing strictly focuses on the psychological and emotional effects the traumatic event has on the individual. "Talking things over" allows a crewmember to better cope with the situation. In the case of very severe incidents or deadly accidents, an actual briefing follows the initial discussion. Peers and a mental health professional

conduct this meeting in strict privacy. The meeting, which can last several hours, takes place after the NTSB interview with the crew. Crewmembers who participate in the CIRP are allowed to talk to a mental health professional for 4-6 sessions without having to list it on their FAA medical form when they apply for their next flight physical. The track record of Critical Incidence Response programs has been very good and many of the intervention teams have successfully assisted pilots when the chips were down and the crewmembers were facing major emotional trauma.

CONCLUSION

Numerous accident reports show that the effects of stress in the cockpit can be disastrous. An interdisciplinary review of the stress literature reveals that commercial pilots, who face stressful events in their work environment, should take a comprehensive approach to stress management. The term "stress" was defined and the "fight-or-flight" response was identified. Next, the body's physical reaction to stress, involving numerous hormones such as adrenaline and cortisol, was explained. The Kobasa Stress Resistance Model was adopted to review the different effects miscellaneous stress management approaches have on the overall stress experience. Specifically, focusing on the stress hardiness characteristics (commitment, challenge, and control) will change the way pilots perceive stressful events and will influence the effects of the stressor on the body. Furthermore, it was suggested that crewmembers should not ignore the emotional warning signs of stress and should instead focus on analyzing and controlling their emotional state. Since stress affects us physically, it is best to release it through physical activities. Regular physical exercise reduces tension and anxiety. The physiological changes that occur during exercise also result in improved cognitive functioning. In the nutritional area, pilots should eat several small meals a day, a balanced diet, and avoid foods and drinks with high sugar content. Moreover, crewmembers should realize that stress builds up over time and will affect flight performance. In addition, different relaxation techniques, where one focuses on the inner self, including breathing exercises and muscle relaxation methods, were identified as effective ways to alleviate stressful situations. Finally, the ALPA Critical Incident Response Program was recognized as an excellent intervention program for pilots who are dealing with major psychological and emotional traumas. The author hopes that the literature review and practices presented in this

paper will promote further empirical research studies in the area of stress management in commercial aviation. □

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