

EXPLORING STRESSORS IN AIR TRAFFIC CONTROLLERS IN SOUTH AFRICA

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FOREWORD

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ABSTRACT

By

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The aim of this study was to explore the stressors in Air Traffic Controllers in South Africa by means of identifying the possible causes of stress as well as to determine the demographic differences such as age, sex and size of Air Traffic Control Centres in these stressors. Air traffic control is commonly considered a stressful job, and the researcher decided to examine the situation in South Africa.

The air traffic control job was also studied to identify the causes of stress as Air Traffic Controllers are very important in their own right and the aviation world are becoming increasingly complex in which air traffic control plays an essential part. Air Traffic Controllers perform extremely demanding and challenging work, as indicated by the fact that many controllers retire before their actual retirement with stress-related work disabilities.

Stressors, applicable to air traffic controllers, were discussed to help the controller to identify his or her source of stress. It is important because stress is an everyday fact of life, which cannot be avoided but must be adjusted to. Stress is often regarded as an individual problem, however, there are characteristics of work, called “job stressors” that can cause a stress reaction in most workers.

The data was collected by means of the Experience of Work and Life Circumstances Questionnaire (WLQ), that was sent to all Air Traffic Control Stations across South Africa. The questionnaire was developed to determine the levels and causes of stress of employees. The WLQ endeavours to establish whether employees experience normal, high or very high levels of stress, and also identify those factors, which cause these levels of stress. The questionnaire consists of three different parts, namely, a demographic questionnaire, experience of work which determine the levels of stress and finally, circumstances and expectations which analyse the causes of stress.

It was clear from this study that for Air Traffic Controllers, uncertainty and lack of control over their own destiny and immediate circumstances, contributed to an increase in the levels of stress. It was clear that Air Traffic Controllers value their skills and want to be rewarded accordingly. Therefore, it was further demonstrated that remuneration, employee benefits and employee policies contribute substantially to the levels of stress experienced by Air Traffic Controllers.

CHAPTER 1 – INTRODUCTION

1.1 BACKGROUND

Being responsible for thousands of human lives everyday while working, is no small task and brings about an incredible amount of stress. Air Traffic Control is one of the most stressful occupations in the world and is right up there with occupations such as brain and heart surgery, except that in this occupation a lot of people can die simultaneously in an instant, should any error occur. Without Air Traffic Controllers keeping the airspace clear and safe for flying, society will have to revert back to earlier times and travel to far destinations by boat, consuming a lot of precious time.

It has long been recognised that Air Traffic Control has many facets to the job. Over the past decade, air traffic has increased tremendously with a growing concern that these volumes may overwhelm Air Traffic Controllers and compromise the safety of air travel. Therefore, more attention has been focused on Air Traffic Controllers and their workload (Brookings, Wilson and Swain, 1996).

Air traffic is increasing dramatically on a yearly basis as travelling by aeroplane become more affordable due to healthy competition between airlines as well as it is an easy manner of transport. Therefore, most people make use of this form of transport at one time or another. The pilot, flying the aeroplane, is seen as the person ensuring their safe arrival at their destination, but in fact pilots only play a part in this journey as Air Traffic Controllers are the people ensuring the safe and efficient flow of air traffic resulting in no mid-air collisions of aeroplanes and safe arrivals at destinations.

According to Teo and Waters (2002), “occupational stress can be defined as an event or situation in which one or more job stressors interact with the worker and lead to an acute disruption of psychological or behavioural homeostasis”.

It should be recognised that Air Traffic Controllers are very important in their own right and plays an important part in the complex world of aviation. The work performed by Air Traffic

Controllers is extremely difficult and testing, as indicated by the fact that many controllers retire before their actual retirement with stress-related work disabilities. Sustained high vigilance is required for successful Air Traffic Control work. Errors in judgement are very uncommon but can have disastrous consequences. It is not surprising in light of these considerations that Air Traffic Controllers are exposed to a high tendency towards hypertension and related illnesses (Ming et al. 2004).

1.2 PROBLEM STATEMENT

Although many studies have been conducted on stress as well as on Air Traffic Control, not many studies have been done on the stressors in Air Traffic Control where decision-making must be done in split seconds. With air traffic increasing every year as well as a worldwide shortage of Air Traffic Controllers, they are bending over backwards to accommodate all the air traffic. The increase in air traffic every year and the world wide shortage of Air Traffic Controllers result in more responsibilities and pressure on the controllers that may lead to an increase in possible incidents and loss of lives. This brings about stress, fatigue and anxieties that very few people take into account as Air Traffic Controllers are only mentioned when mid-air collisions and similar incidents occur.

1.3 AIM OF THE STUDY

The aim of this study is to explore the stressors in Air Traffic Controllers in South Africa. In order to reach the aim of this study, the following objectives will guide the research:

- To identify possible causes of stress for Air Traffic Controllers by means of a review of available literature on this topic as well as a sample survey of Air Traffic Controllers who will complete The Experience of Work and Life Circumstances Questionnaire (WLQ).
- To determine the demographic differences such as age and sex of Air Traffic Controllers as well as the size of Air Traffic Control Centres and the stressors for the Air Traffic Controllers in South Africa.

- Recommendations will be made according to the research and findings on how to relief some of the stressors for Air Traffic Controllers.

1.4 OVERVIEW OF THE STUDY

In addition to chapter one, a short overview of each of the following chapters is herewith provided:

Chapter 2

A theoretical overview of work stress is addressed including definitions, main symptoms of stress, how to handle stress and the effect of stress.

Chapter 3

In this chapter Air Traffic Control is defined by means of history and background, characteristics of an ideal Air Traffic Controller as well as criteria for the application of an Air Traffic Control licence.

Chapter 4

This chapter focuses on the effect of stress on Air Traffic Controllers by looking at sources of stress in Air Traffic Control, a previous study, Type A personality as well as counselling as coping mechanism.

Chapter 5

This chapter addresses the methodology that was used to conduct the study with particular emphasis on the sample and the measurement instrument, the latter being the foundation to collect the data and hence do the data analysis.

Chapter 6

This chapter focuses on the results obtained during the statistical analysis of the data.

Chapter 7

In this chapter the researcher highlights and recommends interventions in those areas of concern in terms of causes of stress for Air Traffic Controllers.

CHAPTER 2 – WORK STRESS

2.1 INTRODUCTION

Stress is an everyday fact of life, which cannot be avoided as it is caused by change that a person must adjust to. Stress is a condition or feeling experienced when a person feels that he or she cannot live up to certain demands and that it exceeds their personal and social resources available to them to cope with these demands. In aviation, accidents almost always occur when a sequence of mistakes are made, almost like a domino effect. Stress is the finger that often pushes the first domino into the rest and thereby causing the well-known effect (AviationKnowledge, 2009). All people have got coping mechanisms to deal with stress in whichever form it may occur, namely when a person is tired, he or she tries harder and when a person is hot, he or she sweats as a form of a natural cooling.

All stress is not bad, as a certain amount of stress is not only desirable but also essential to enhance performance. Stress can be healthy for a person as it pushes a person to excel, to enhance in life and to achieve goals and objectives. A lack of stress can cause inactivity and a feeling of boredom but on the other hand, too much stress can cause a person not to cope with demands and this may cause people to suffer and not being productive.

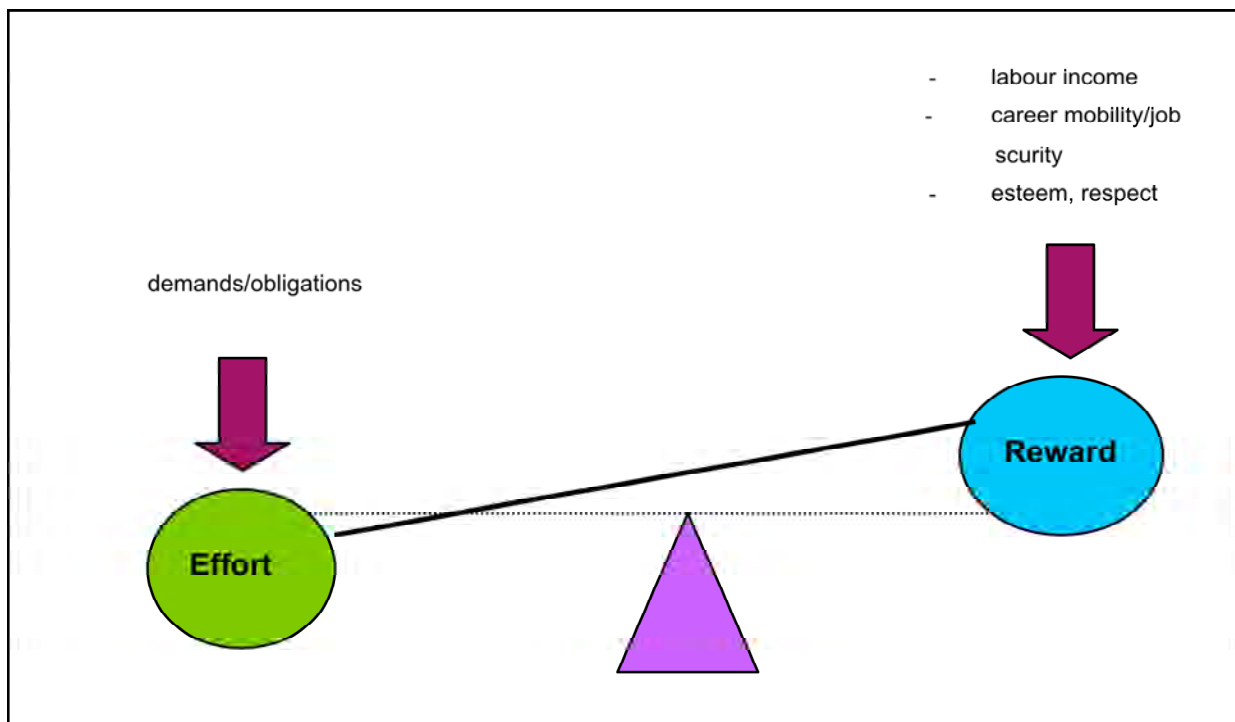
As soon as a person's coping mechanisms are no longer sufficient to handle stressful situations, stress can become unhealthy and a person's performance can decline. This is because when people are over-stressed, their judgement can be impaired and the safety and efficiency of the work can be put at risk. The right amount of stress can make persons dynamic and ensures that they pay attention, leading to good work and the person feeling satisfied (AviationKnowledge, 2009).

According to the International Transport Workers' Federation (2009), stress can be seen as an individual problem, however, jobs do have characteristics, "job stressors" that can cause a stress reaction in most workers. "Work stressors can be defined as barriers in the work place that are due to inadequate work organisation, management, leadership or

technical and environmental design and imbalances between the amount of effort put into work compared to the rewards received by individuals”. Some of these work stressors include high work demand, co-workers and supervisors not providing support within the workplace and no future career prospects.

Another cause of stress is effort-reward imbalances. An imbalance between effort and reward causes stress among employees who obtain low rewards but who works hard and contribute positively to the organisation. Rewards are defined by three components namely, remuneration, job promotion opportunities (career opportunities) including job security and non-material rewards in terms of esteem, recognition or appreciation given by supervisors and managers.

Figure 1: Effort-Reward Imbalance Model



Source: Stressed and Fatigued on the Ground and in the Sky (2009)

Employees will experience high levels of stress when they believe that they have contributed positively with high efforts to the organisation, but in return also believe that they have not received appropriate or enough reward for their efforts. People handle

stress differently and therefore those who are over-committed will continue to increase their efforts because they want to be praised and want to receive recognition and approval and therefore they will experience even more stress under such circumstances. People, who put more effort into their work because they think they will receive salary increases or bonuses but perceive it not to happen, will also experience a lot of stress, but will more often realise that at least they have got a job and some will even slack in their commitment. This can lead to job dissatisfaction and the employees will look for other jobs, especially if they are well qualified and there is a shortage of skills such as Air Traffic Controllers who often leave South Africa to work in other countries. The United Arab Emirates is a popular alternative as they are better paid there as in South Africa even though the volume of air traffic is much more intense there.

Job stress is a result of employees that cannot cope with the demands of the work due to various reasons such as insufficient training, a lack of resources, too much work, no future career prospects and no assistance from supervisors or co-workers. Employees who are exposed to constant stress have got a higher possibility to experience physical and psychological conditions such as heart attack, hypertension, diabetes and depression. This may result in a vicious spiral effect because this may lead to some people smoking and drinking in order to try and cope with the work stress, but in return it only contributes to the medical conditions (AviationKnowledge, 2009).

2.2 MAIN SYMPTOMS OF STRESS

According to AviationKnowledge (2009), there are four types of symptoms that a person may experience when under constant stress, namely physical, emotional, behavioural and cognitive symptoms.

- Physically a person may experience the following symptoms: tense muscles especially in the neck and shoulders, nausea, diarrhoea, tiredness or difficulty sleeping, unusual rapid heartbeat, weight loss or weight gain.
- Emotional symptoms are the feelings and emotions that people experience and may include frustration, anger, depression, nervousness, irritability or boredom.

- Behavioural symptoms are indicated by a change in behaviour such as alcohol or drug abuse, marital problems, binge eating and self-destructive behaviour,
- Cognitively, the symptoms as they occur, consist out of forgetfulness, difficulty to concentrate, indecisiveness, work mistakes and loss of productivity, excessive worrying and loss of sense of humour.

According to Eurocontrol (2004), due to the acute and exceeded levels of stress experienced by Air Traffic Controllers, the following specific stress symptoms can be experienced:

- A loss of self-esteem with the addition of negative effects such as feelings of shame, guilt and helplessness, combined with great physical tiredness. These negative effects and low self-esteem affect both the private and professional life of the Air Traffic Controller simultaneously. What happens is that Air Traffic Controllers feel inadequate in their job, which affects the controller's self-image and relationship with others.
- When a critical situation arises, the Air Traffic Controller singles himself or herself out and puts himself or herself on the fringe of the group. Confrontation with a control accident affects the person's ideals and those of the group. These ideals of not ever having a control accident let them believe in themselves and they draw strength and efficiency from that, but it makes them particularly fragile within the Air Traffic Control community.
- After a control accident, the Air Traffic Controller experiences psychological and physiological defences followed by aggression. This leads to the Air Traffic Controller being subjected to great vulnerability that requires very special attention. In fact, during these time periods the Air Traffic Controller is most conducive to the crippling symptoms of stress becoming imprinted in the psyche. Reliving of the event while awake, through a sensorial imprint of a visual nature, is part of the process of trauma.

The imprint of the moment of dread (the critical incident) in the Air Traffic Controller's psyche becomes an internal threat because the traumatic image sets in and remains a source of anguish with short -and long-term effects. Very often, Air Traffic Controllers who

have been exposed to a critical incident, relive the experience while awake and have nightmares and hyper-vigilance. This prevents the Air Traffic Controller from carrying out any ordinary task in his or her work, without recalling what happened during this incident (Eurocontrol, 2004).

2.3 STRESS SOURCES

According to Eurocontrol (1996), stress is experienced from three basic sources namely:

- The Environment
- The Body
- Thoughts

2.3.1 The Environment

Within the environment there are various demands people must adjust to. Some of the demands they have to endure and adapt to are weather, noise, interpersonal demands and time constraints.

2.3.2 The Body

Physiological stress such as critical incidents, mid-air collisions, unhealthy diets, shiftwork and lack of exercise and sleep - all takes its toll on the body. People's reaction to environmental demands and changes also produce body changes, which are stressful by itself.

2.3.3 Thoughts

The third source of stress is people's thoughts. The brain interprets and translates complex events in the environment and body and triggers panic. How people understand, perceive, and label their present experience and what they predict for the future can serve either to relax or stress them. An unpleasant look from the boss is likely to make them nervous as they may well interpret that as a reaction to inadequate performance and

trouble forthcoming. Interpreting the same unpleasant look as tiredness or preoccupation with personal problems will not be as worrisome.

2.4 REACTION TO STRESS

Stress presents itself in a number of different forms. An employee that experiences high levels of stress may become depressed, anxious, accident prone and argumentative. Such an employee may also find it difficult to make routine decisions and may become easily distracted which will not allow him or her to be fully productive and this can lead to critical incidents in the case of Air Traffic Controllers.

According to Robbins and Coulter (1999), reactions to stress can be investigated on three different levels namely, physiological, psychological (emotional) and behavioural.

Table 1: Stress Reactions

Physiological Reaction	Psychological (Emotional) Reaction	Behavioural Reaction
<p><i>Initial Phase:</i> Shock reaction, the reaction is optimal.</p>	<p><i>Anger Phase:</i> The anger can differ between a feeling of anger and extreme violent outbursts.</p>	<p><i>Destructive Adaptation Strategy:</i> When individuals give up, become angry and withdraw.</p>
<p><i>Resistance Phase:</i> The body shows resistance towards the stressor. The body goes into action.</p>	<p><i>Anxiety, Fear, Terror:</i> Any stressor can give rise to fear that can lead to terror and anxiety in extreme forms.</p>	<p><i>Constructive Adaptation Strategy:</i> Healthy, long-term adaptation strategy to assist with coping of stressors.</p>
<p><i>Burnout Phase:</i> If the stressors are extreme and continue, the individual will feel the impact in the form of extreme exhaustion.</p>	<p><i>Depression, Grief and Sorrow:</i> Can give rise to a feeling of depression and despondency.</p>	

Source: Career Management (2008)

As in most situations, a person will encounter certain stressors or triggers that impact them. Each individual has different ways to handle these stressors. As soon as extremely high levels of pressure (stress) occur, it can have a direct impact on work absenteeism, labour turnover and in the case of Air Traffic Control, it can lead to mid-air collisions (critical incidents) resulting in loss of lives and severe trauma.

2.5 CONSEQUENCES OF STRESS

According to the Laval University (n.d.), too much stress can lead to mental health problems for individuals. The following main symptoms can be found in the workplace:

2.5.1 Mood Disorders

All people experience events from time to time which cause various feelings such as happiness, sadness and discouragement. These feelings of sadness and discouragement last a short period of time and are experienced after a stressful event such as a mid-air collision. When people continuously experience too much stress, normal mood swings may translate into being serious mood disorders. These mood disorders can impact a person's social and work life when they become excessive in nature. People often need to be hospitalised and receive treatment and medication when it spirals out of control.

2.5.2 Anxiety Disorders

There is a clear distinction between fear, normal anxiety and anxiety that is considered pathological. With fear people react to a threat or danger that really exists, and anxiety is when a person feels uneasy about a danger or threat without exactly knowing what that danger or threat really is. Like stress, anxiety can be beneficial when it helps the person to adapt and find solutions. When anxiety diminishes a person's ability to function at work in his or her family and social lives, it may be considered dangerous and pathological.

The physical symptoms associated with anxiety differ somewhat from those associated with panic attacks and panic disorder. The symptoms of panic are characterised by

increased heart rate, palpitations, perspiration and trembling. The symptoms for anxiety are characterised by muscle tension, mental agitations, susceptibility to fatigue, some irritability and lack of sleeping. People with anxiety can turn any small event into a catastrophe or crisis and they focus a lot more on possible sources of stress as they worry about any small thing. This high sensitivity may have arisen in early stressful experiences at work such as previous critical incidents that happened while a specific Air Traffic Controller was on duty (Laval University, n.d.).

2.5.3 Burnout

Burnout is normally a consequence of too much stress. Burnout can be defined as “emotional exhaustion, depersonalisation and a feeling of low personal accomplishment”. Burnout results when individuals have no work-life balance as they work even harder and focus even less on their personal life, while enjoying their work and work environment less and less. This state manifests itself through emotional or physical exhaustion, reduced productivity at work and a feeling of depersonalisation (feeling of inconsiderateness or distant responses to clients).

Burnout is not seen as a mental disorder but rather as an adjustment disorder. A person suffering from an adjustment disorder has inappropriate reactions following a stressful event such as job loss or critical incidents at work. These events impact their functioning at work, their social behaviour and usually persist for more than three months after the event. Symptoms of burnout may include trouble sleeping or sleeping too much, loss of self-confidence, feeling of incompetence, guilt, difficulties in concentrating and amnesia. Total lifestyle change is needed to recover fully from burnout. A person needs to rest more, set aside time for recreational activities and take better care of their health by following a balanced diet and exercising (Laval University, n.d.).

2.5.4 Survivor Syndrome

Survivor syndrome is not seen as a mental illness but has an influence on a person's mental health and can lead to problems such as depression and burnout. After a critical incident, Air Traffic Controllers may feel as a survivor, due to the fact that he ensured that the incident did not result in a fatal accident or in the case of a mid-air collision, that he or she is literally a survivor and not physically part of the accident. This survivor feeling may lead to Air Traffic Controllers feeling guilty, depressed, fatigued, angry, loss of self-confidence and anguished due to them surviving and not like the others being involved in the mid-air collision. This will impair their ability to perform the work, which can lead to even more depression and a belief of incompetence in their ability as Air Traffic Controllers (Laval University, n.d.).

2.5.5 Fatigue

Shift work is essential within the Air Traffic Control domain due to the nature of the work as well as due to changes in customer demands and community expectations, combined with the arrival of global competition in aviation. Consequently, Air Traffic Controllers are now required to work extended shifts and/or to work shifts that are outside the standard 9-to-5, Monday-to-Friday working week as the aviation world do not only operate during specific days and times. The shiftwork leads to sleep loss and body clock disruption and it may lead to increased levels of work-related fatigue, which manifests as reduced alertness, impaired neurobehavioral performance, increased sleepiness, and ultimately they have a greater risk of injury and accidents at work. All of this increases the stress levels of Air Traffic Controllers due to the fact that they cannot afford not to be 100% on top of their "game" (work) as they are responsible for thousands of human lives everyday.

When persons experience fatigue they believe that they are inadequate in their jobs, that they must always perform perfectly, must always be able to cope and should never show weakness. They also believe that depression is evidence of weakness. People who fall trap to fatigue are usually achievement-orientated (a lot like Type A Personality), put on a brave face and do not ask for any help. Fatigue is triggered by too much stress and can cause acute illness. Symptoms include acute tiredness, muscle pain and an inability to

function. This leads to people thinking that they are only physically ill and that it is not serious. They believe they can handle it by just trying harder to cope and to be even more brave and dedicated. This results in the person being frustrated and emotionally distressed and this increases the stress experienced which leads to a vicious cycle if professionals are not consulted (Laval University, n.d.).

2.6 POST-TRAUMATIC STRESS DISORDER (PTSD)

According to Boege and Gehrke (2005), an accident, in the line of work, cannot only produce physical damage, but more often also harm a person psychologically. If for instance a mid-air collision between two aircraft occurs, the Air Traffic Controller on duty during this traumatic experience, might not suffer from any injuries, but will quite severely be affected psychologically. He or she may even be unable to continue work as by merely thinking of going to work, may lead to memories of what happened, resulting in panic attacks.

PTSD is a delayed reaction to a stressful event or a situation of extreme threat. It often starts only one month after the event, rarely more than six months after it. The main symptoms are flashbacks of the traumatic event, which are often just as intense as when the accident occurred. In addition, avoidance behaviour such as not leaving the house in order not to expose oneself again to danger, or avoiding the areas where the accident happened and lastly over-excitement, which may include not being able to sleep, difficulties to concentrate and being easily irritated.

Figure 2: Example of Posttraumatic Stress after witnessing a Critical Incident (Near-Accident)

“...near the end of a night shift I was controlling the flight. On take-off the aircraft suffered what is known as a bird-strike, which is when the engines suck in a flock of birds. The pilot initially reported that an engine was on fire. From the tower I could see that the aircraft was unable to gain altitude and was continuing in line with the runway. In a second call the pilot confirmed that engine number 1 was on fire and that number 2 had lost power and that he was still flying over the city at low altitude. He finally managed to extinguish the fire, achieve maximum power in engine number 2 and make an emergency landing. Despite the crew's satisfaction at the happy outcome of the event, in the new few days I

began to suffer recurring nightmares in which I saw the plane crashing over the city...”

Source: Preventing Posttraumatic Stress – Psychological First Aid in the Workplace (2005)

In aviation it is expected that Air Traffic Controllers carry out the right actions all the time but what is unexpected is the stress, trauma, questions and running over the incident again and again in a person’s mind when something went wrong even when you know you did the right thing. Post-traumatic stress plays a big part in Air Traffic Control, especially after an incident or accident, and takes its toll on all. A symptom of post-traumatic stress is the inability to sleep, where a person sleeps very little and when you are awake, the incident keeps running through your mind and you struggle to shake the image of tragedy from your mind. The thoughts of what happened, how you reacted and what you could have done differently keeps going through your mind. This is really tiring for an individual, but still sleep is illusive because when a person falls asleep, the images of what happened of what might have happened are in their minds.

According to Barlow and Durand (2005), a panic attack can be defined as “an adaptive fear response occurring at an inappropriate time”. The alarm reaction is much the same in both panic disorder and PTSD, but in panic disorder the alarm is false. In PTSD, the initial alarm is true in that real danger is present. If the alarm is severe enough, people may develop a condition of learned alarm reaction to stimuli that remind them of the trauma, for instance the sound of an aeroplane can remind an Air Traffic Controller of a critical incident that happened or even an accident between aeroplanes. People may also develop anxiety as they are scared of experiencing even more emotions which they are unable to cope with.

According to Barlow and Durand (2005), most clinicians agree that victims of PTSD should re-experience the original trauma in order to develop effective coping mechanisms and thus overcome the devastating effects of the disorder. It is very important that the re-exposure must be therapeutic rather than traumatic, otherwise it will present itself as too traumatic for the person. The downside to this is that it is very difficult to correctly recreate such traumatic event and very few therapists want to try. Therefore, they rather work systematically through the content of the trauma and the emotions associated with it.

Unfortunately, many trauma victims repress the emotional side of their memories of the traumatic event, and sometimes, they even experience memory loss. This happens automatically and unconsciously but it can prolong recovery. On occasion, with treatment, the memories flood back and the patient very dramatically relives the episode. Although this may be very frightening to both patient and therapist, it can be therapeutic if handled appropriately. The sooner structured interventions are delivered after the trauma, the better the possibility of preventing the development of PTSD.

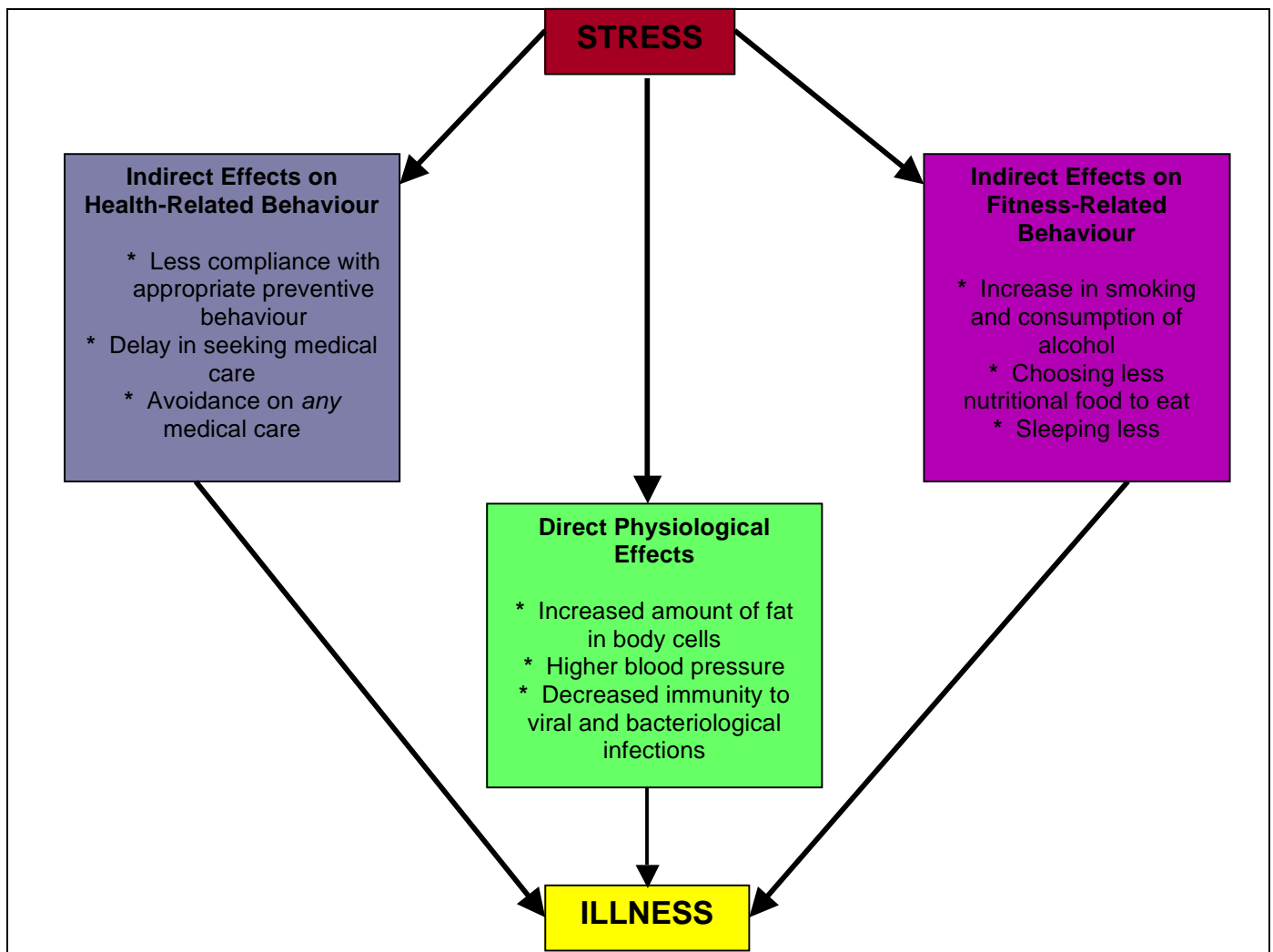
2.7 PHYSIOLOGICAL EFFECTS OF STRESS

How could stress cause physical illness? This is a regularly asked question but according to Baron and Byrne (2003), direct and indirect effects of stress each lead to an increase in illness, as is illustrated Figure 3. The indirect effects occur when the negative emotional effects of stress interfere with health-related behaviour, such as eating a balanced diet or scheduling a physical examination.

The direct physical effects delay the healing process in wounds, this has a negative effect on the endocrine system and interferes with the functioning of the immune system. Research focused on one such an example on the well-established fact that college students show an increase in upper respiratory infections as exam time approaches. In the work environment, people who blame themselves for work that turned out badly, the finding was similar indicating that their immune system suffers.

As stress increases, anxiety and anger also increase and these negative emotions bring about increased risk of illness, the malfunctioning of the immune system, pain and even a greater possibility of dying. Unfortunately, Type A personality individuals, compared to Type B personality individuals, are more hostile, have higher blood pressure and are twice as likely to develop heart disease. This is also an indication on the danger of continuous stress experienced by Air Traffic Controllers, as they are all prone to be Type A individuals, as these characteristics assist them in their daily work as Air Traffic Controllers (Baron & Byrne, 2003).

Figure 3: Stress and Illness: Direct and Indirect Effects



Source: Social Psychology (2003)

2.8 MANAGING STRESS

Due to the fact that people differ from one another, they experience stress differently and they also handle stress in different ways. What may be seen as a very stressful situation to one person may not be as stressful to another person and may only enhance his or her performance. The manner in which stress is handled is also dependent on the person's age, life-style, work experience, personality traits, attitude, motivation and physical and mental health. One person may make use of certain coping mechanisms to handle stress but the exact same ones may be ineffective to another person. According to Costa (1995), there are certain guidelines that people can follow to make stressful situations more manageable:

- Maintain good physical fitness as exercise helps to relax and to take your mind of troubles for a while or give you perspective on the troubles;
- Have regular meals and follow a healthy diet;
- Do not start or increase your smoking habits, alcohol intake as well as the consumption of drugs (stimulants, tranquillizers or anti-depressants), as it only assists for a short period of time. In the long run it only causes further problems in your health and well-being.
- Sleep enough so that your body and mind can rest and restore energy for the next day;
- Have a well-balanced social and family life so that financial and domestic issues do not become problems;
- Share and discuss problems so as not to bottle them up as this will increase stress levels;
- Solve problems as soon as possible to prevent it from becoming unmanageable;
- Change your way of thinking about the stressor, rather try to see it as a challenge that can be overcome;
- Listen to music, read a book or engage in other enjoyable activities; and
- Talk to professional psychiatrists or psychologists for assistance if it can be solved internally.

It is very important for any organisation to ensure that they have competent, productive and healthy employees. According to Costa (1995), organisations and its managers can also play an important role in the reduction of the stress levels of their employees.

- Ensure that the employees' work environment is conducive to the type of work that they perform. For example, where shift work is essential, ensure that there are canteens available as well as resting facilities for the employees to make use of while they are at work.
- Employees can be assisted by means of ensuring the reliability of work systems, the reduction or flexibility of working times to ensure good work/life balance, the arrangement of shift schedules according to psycho-physiological and social criteria

and involve employees in decision-making, especially those that directly affect them so that they feel part of the organisation.

- Improvement of the workplace such as ensuring that there is sufficient light, micro-climatic conditions and indoor air quality as well as a reduction in noise, to improve concentration and eliminate disturbances.
- As Air Traffic Controllers remains seated in front of the console for long periods of time, it can cause musculo-skeletal discomfort and pain particularly at the level of the neck, shoulders and the lumbar tract. To alleviate it, organisations should ensure that suitable chairs, which allow for comfortable sitting postures as well as muscle relaxation, must be available to all Air Traffic Controllers in the air traffic control centre.
- Ensure the improvement of individual responses and behaviour through giving guidance to individuals on coping with stress and having supporting measures, such as support programmes (employee assistance programmes) in place for employees to make use of in highly stressful situations. This will assist employees not to make use of short-term ineffective ways of coping with the stress, which will, in the long term only cause further health problems, such as smoking, alcohol and drug abuse.
- Introduce a “fitness for work” approach into the organisation with a very positive intervention designed to maintain and improve the health and well-being of employees such as gym facilities with certain incentives for employees, when properly making use of it. There is no doubt that physical exercise, if carried out regularly and in a non-competitive way, is beneficial for all the body functions and will improve both physical and psychological well-being (Costa, 1995).

2.9 CONCLUSION

Stress is an everyday fact of life, which cannot be avoided as it is caused by change that a person must adjust to. As soon as a person’s coping mechanisms is no longer enough to handle stressful situations, stress can become unhealthy and a person’s performance can decline. This is because when people are over-stressed, their judgement can be impaired and the safety and efficiency of the work can be put at risk. The right amount of stress can make a person active and interested, leading to good work and the person feeling good.

Employees who are exposed to constant stress have a higher tendency to experience medical conditions such as heart attack, hypertension, diabetes and depression. This may result in a vicious spiral effect because this may lead to some people smoking and drinking in order to try and cope with the work stress, but in return it only contributes to the medical conditions. Too much stress can lead to mental health problems for individuals such as mood disorders, anxiety disorders, burnout, survivor syndrome, fatigue and post traumatic stress disorder.

Due to the fact that people differ from one another, they experience stress differently and they also handle stress in different ways. What may be seen as a very stressful situation to one person may not be as stressful to another person and may only enhance his or her performance. The manner in which stress is handled is also dependent on the person's age, life-style, work experience, personality traits, attitude, motivation and physical and mental health.

CHAPTER 3 – AIR TRAFFIC CONTROL

3.1 INTRODUCTION

In the early thirties, there was no real need for a formal and organised Air Traffic Control service. Even though aircraft were already flying in those days, it meant that pilots could only fly in good weather conditions when other aircraft were visible to them in order for them to avoid one another. Aircraft were only adjusted in the late thirties with instruments to assist pilots with flying in less good and visible weather conditions.

As more aircraft was built and more flying was done, airports were built and aircraft had to land at these airports. With the airspace around the airports congested with aircraft and no real system to dictate when which aircraft must land, Air Traffic Control services were established and introduced with very specific rules and regulations in order to keep pilot and aircraft safe from take-off to landing. Ever since the first Air Traffic Control service was established until now, Air Traffic Control has evolved into a very essential service for airlines and passengers and a very specialised and respected occupation.

According to Van Rooyen (personal communication, January 25, 2011), Air Traffic Control is a 24 hours, 365-days-a-year job and therefore Air Traffic Controllers usually work rotating shifts, including nights, weekends and public holidays. In South Africa the shifts are seven hours long whereby the Air Traffic Controller work two hours at a time followed by a rest period of an hour, if the air traffic allows for it, otherwise only a 30 minutes rest period. There is a roster available for every sector, indicating which Air Traffic Controller works on which days and what shifts and it is usually set twenty eight days in advance in order for the Air Traffic Controllers to manage their days and schedules.

In many countries the structure of controllers' shift patterns is regulated to allow for adequate time off, such as in the United Arab Emirates where they work two morning shifts, two afternoon shifts and two night shifts followed by a four day break whereby the whole schedule starts over again. Due to the shortage of Air Traffic Controllers in South Africa, they use another approach whereby the shifts are not regulated and they can work

one morning shift then a night shift and then two afternoon shifts for example. The rule in South Africa is that an Air Traffic Controller may not work more than seven days continuously without having at least one rest day and they must have one weekend off during every 28-day cycle. This also enables them to have eight days off within a cycle, ensuring adequate time off.

The primary goal of Air Traffic Control (ATC) services is to provide for safe airspace, and to ensure that all aircraft will transport passengers safely to and from their destinations by navigating them orderly according to their abilities (Nunes et al., 2004). Air Traffic Controllers provide pilots with the necessary information and clearances, to ensure that their flights are safely separated from all other aircraft operating within the same airspace. Air Traffic Controllers apply separation rules to keep aircraft apart from each other in their area of responsibility and move all aircraft safely and efficiently through their assigned sector of airspace.

For Air Traffic Controllers to be able to perform their duties, they need certain tools to be able to see all the aircraft in their airspace and to be able to communicate with them and give them instructions which they must follow in order to avoid incidents and accidents (Nunes et al., 2004).

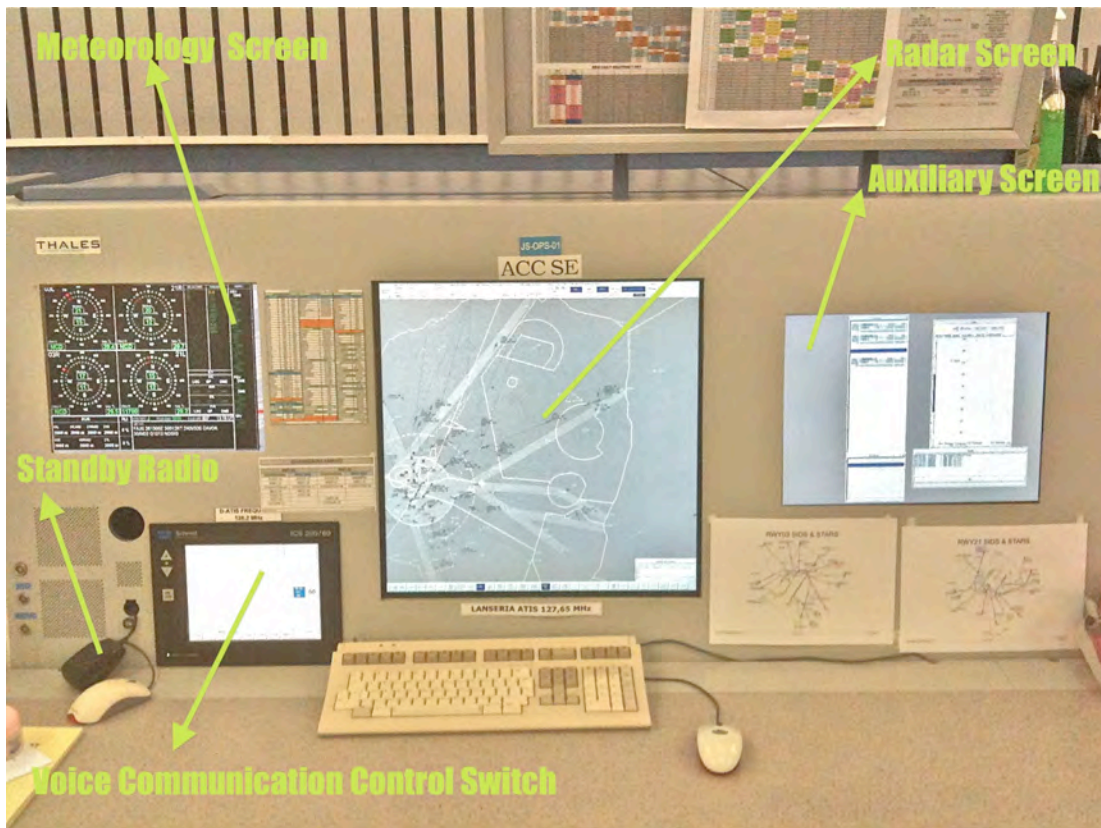
3.2 AIR TRAFFIC CONTROL WORK TOOLS

“The ‘position’ is equipped with two radar screens, a radio set for communication with aircraft, a telephone set for communication with the other positions of the centre or any other centre and finally, a communication interface with the flight plan processing calculators; these different devices are the controllers’ tools”.

Cours des comptes, November 2002

According to Eurocontrol (2004), Air Traffic Controllers’ work tools are different in size, colour and shape but the main elements that enable them to carry out their work are similar throughout the world. The work-stations of a radarist and a co-ordinator are the same. The description of a work-station and that of the work tools will be summarised by listing the main items:

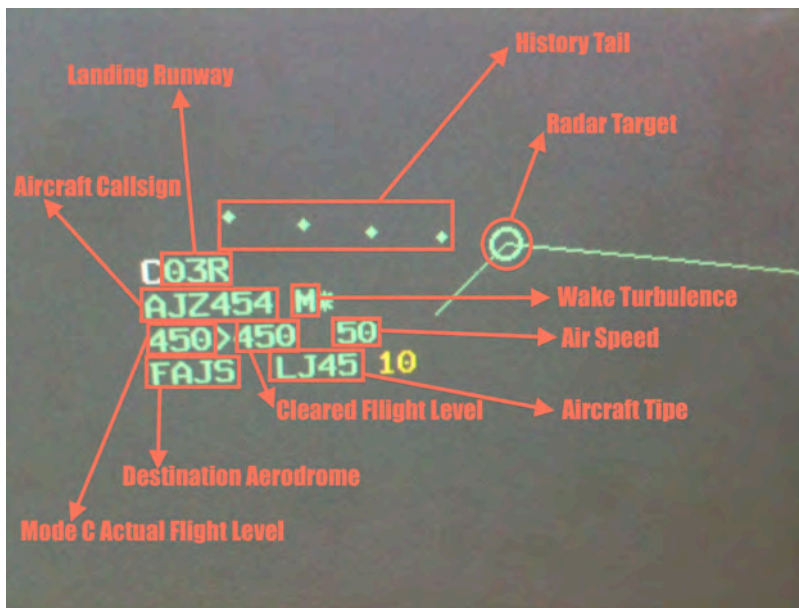
Figure 4: ATC Work Tools



Source: Photo's taken at OR Tambo International Airport (Johannesburg Centre) (2011)

3.2.1 Radar

Figure 5: Radar Target



Source: Photo's taken at OR Tambo International Airport (Johannesburg Centre) (2011)

A screen (similar to a build-in computer screen) presents the image of the current traffic on the volume of space controlled by a sector. The planes are represented by a radar target, to which labels with the following items are associated:

- Aircraft Call Signs;
- Altitude in feet;
- Cleared flight level;
- Departure point (Airfield);
- Wake Turbulence;
- Speed and
- Transponder Code, called a squawk code.

Other items may be displayed if the Air Traffic Controller so wishes, such as speed and radio code, together with other information (Eurocontrol, 2004).

3.2.2 Radio

The radio provides communication with the aeroplanes. The Air Traffic Controller can communicate with pilots by choosing, depending on the current rules, to use the microphone with speakers integrated in the radar unit, or wear headphones with an integrated microphone, which is the most commonly used option.

3.2.3 Telephone

The main purpose of the telephone is to enable the Air Traffic Controller to carry out the necessary co-ordination work with adjacent centres. The lines used are programmed according to the needs of each sector. It can be seen from the photograph taken at Johannesburg Centre (OR Tambo International Airport) in 2011 that the Voice Communication Control Switch encompasses both the radio and the telephone function.

Figure 7: Paper Strips in a Procedural Bay



Source: Photo's taken at OR Tambo International Airport (Johannesburg Centre) (2011)

A certain number of fields are printed on the paper strips but it differs depending on what sector handled the strips:

- The identification of the aircraft (callsign);
- The departure and arrival airports;
- The beacons through which its flight plan route passes; and
- Its flight level on entry to and exit from the sector.

The strip rack (bay) is the centre of activities for the Air Traffic Controller. The cards, which are classified according to principles that are very clear and understandable for all Air Traffic Controllers, are a starting point for the building of the mental image of the current air situation and the situation as it can be foreseen in the near future. This is a tool used for the planning and control of different actions and tasks carried out by a sector. The strips contain the information per flight and are moved with the development of the traffic (Eurocontrol, 2004).

South Africa, together with some European Control Centres are already utilising electronic strips as the paper medium has completely been removed and it looks as follows:

Figure 8: Electronic Strips

JURISDICTION							
▶	CAW104	M	N0430	330	EGTIL	APRAX	TEVAR
	3225	B734	330	330	1323	1357	1406
	CEN	FACT	1243	FAJS N	330	330	330
CONT	/251001177						
◀	EXY017	M	N0420	300	29 026	DTALA	SUDUS
	5505	CRJ2	241	300	1319	1349	1414
	CEN	FABL	1311	FACT	300	300	300
CONT	/SAR NML						
◀	MN0137	M	N0450	320	APMIN	EGNOM	NOKOX
	5405	B738	320	320	1309	1344	1412
	CEN	FAJS	1241	FACT	320	320	320
CONT	/SAR NML						
▶	MN0704	M	N0450	390	APLEN	GEPES	EXAND
	3712	B738	370	370	1320	1350	1405
	CEN	FACT	1245	FALA N	390	390	390
CONT	/SAR NML						
◀	SAA343	H	N0463	400	APMIN	EGNOM	NOKOX
	5474	A343	400	400	1315	1351	1420
	CEN	FAJS	1248	FACT	400	400	400
CONT	/GPS/2610*						
▽	UAE770	H	N0499	340	23 028	APLEN	OKLOK
	0532	B77W	340	340	1228	1335	1400
	CEN	OMDB		FACT A	340	340	340
CONT	/RNAV1 RN*						
◀	ZSAAM	L	N0450	400	GEPES	APLEN	OKLOK
	0670	PRM1	400	400	1257	1333	1402
	CEN	FALA	1222	FACT A	400	400	400
CONT	/SAR NML						
◀	ZSAMP	M	N0480	430	GEPES	APLEN	OKLOK
	6635	GLEX	430	430	1306	1339	1405
	CEN	FAWK	1236	FACT	430	430	430
CONT	/RNP4/TCA*						

Source: Photo's taken at OR Tambo International Airport (Johannesburg Centre) (2011)

In the future, in order to be able to cope with the traffic increase, it will be necessary to provide higher-performance computerised solutions than those currently in existence. In fact, while computerisation on board aircraft has progressed greatly, in particular due to glass cockpit technologies, one cannot but observe that Air Traffic Control working

methods have hardly advanced at all over recent years, in any country. Despite numerous promises regarding the establishment of automated systems, which, it was thought, would perform the tasks of detection of conflicts between aircraft more efficiently and then solve them, Air Traffic Controllers are still working with former-generation instruments. This indicates that Air Traffic Controllers, for the foreseeable future and with never-ending increasing air traffic, will therefore continue to be responsible for their own actions and will not be able to depend too much on technology or on greater automation of the work process (Eurocontrol, 2004).

In an Air Traffic Control system, humans interact with machines to fulfil the functions of the system. A safe and efficient system must include appropriate technology. An additional but vital aim is to ensure the continued provision of Air Traffic Controllers who can fulfil the standards and objectives of Air Traffic Control with existing and new facilities and equipment. The Air Traffic Controller needs to have an understanding of how the Air Traffic Control system has been designed and functions, in order to interact with it and to contribute towards the benefits of the controller's professional knowledge.

In order to handle the increased air traffic, Air Traffic Controllers must be highly skilled and trained. The Air Traffic and Navigation Services Company are responsible for the management of South African airspace. According to Van Rooyen (2011), their Air Traffic Control operation roles include:

- Aviation Information Management (AIM) is responsible to send and receive all aviation related documentation such as flight plans and NOTAM (notice to airmen).
- Air Traffic Service Assistants (ATSAs) work as support to the Air Traffic Controllers, do flight plans, logs, query resolution and also in some cases provide an airspace information service.
- Aerodrome Air Traffic Controllers (ATCO1) are responsible for air traffic control in the aerodrome environment, including takeoff, landing and taxiing clearances.
- Senior Air Traffic Controllers (ATCO2) are responsible for the procedural approach and Aerodrome control.
- Principal Air Traffic Controllers (ATCO3) are responsible for the radar approach and area control.

3.3 CHARACTERISTICS OF AN IDEAL AIR TRAFFIC CONTROLLER

According to ICAO (1993), in any occupation there is certain characteristics and attributes that, when possessing them, makes a person a better candidate. Some of these characteristics for Air Traffic Controllers are:

- Self-confident person;
- Must have a certain level of English proficiency;
- Must be able to work under pressure and absorb stress;
- Must be able to multi-task;
- Must have a passion for aviation;
- Psychological stable and have good human relations;
- Must be able to assess a situation and make a decision in a split second; and
- Medical fit as they undergo medical testing each year as it is a prerequisite to keep their Air Traffic Control licences.

Air Traffic Controllers are well-organised individuals who are quick with numeric calculations, who do not hesitate to make decisions and possess excellent short-term memory and visual memory abilities. Studies have also shown that Air Traffic Controllers generally have a much higher degree of situational awareness than the average population. They can speak clearly and calmly even under stressful circumstances. They are assertive and ensure that pilots do as they say but they are also flexible and when air traffic allows it, they will assist pilots where they can without breaking rules. Air Traffic Controllers have very strict medical and mental requirements which they must abide by as certain medical and mental disorders act as restrictions for people to become Air Traffic Controllers. Hypertension does not disqualify a person from becoming an Air Traffic Controller, but it is taken seriously and must be monitored with medical examinations by certified doctors as it may affect a person from time to time. Air Traffic Controllers must take precaution to remain healthy and they may only use specific medication, as some contain substances that may impair their concentration ability (ICAO, 1993).

Good hearing abilities are very important as communication is such a vital part of the job. There can be no misunderstandings when pilots and Air Traffic Controllers communicate with each other as it may have tragic consequences for all parties involved. Air Traffic Controllers communicate with the pilots of aircraft using a push-to-talk radiotelephony system, which has many attendant issues such as the fact only one transmission can be made on a frequency at a time or transmissions will either merge together or block each other and become unreadable. This can cause chaos during a critical incident because pilots need to receive urgent instructions from the Air Traffic Controller to avoid a mid-air collision or a critical incident.

Air Traffic Control communication is done in English, which is the aviation language throughout the world. Controllers who do not speak English as a first language are expected to show a certain minimum level of English proficiency, which is ICAO Level 4. Teamwork plays a major role in an Air Traffic Controller's job, not only with other controllers and air traffic staff, but also with pilots, engineers and managers (ICAO, 1993).

3.4 CRITERIA FOR APPLICATION OF AIR TRAFFIC CONTROLLER LICENSE

According to ICAO (1993), the following criteria are necessary for members who apply for an Air Traffic Control licence:”

- Must be able to speak without a speech impairment;
- Must have knowledge of aviation rules and regulations;
- Must have knowledge on all aircraft types and their performance;
- Must have knowledge on aviation navigation;
- Must be able to interpret weather forecasts and reports as well as synoptical maps;
- Must have knowledge on the use of altimeters;
- Must have successfully completed the specific Air Traffic Control course required to advance in a specific operational role; and
- Must have been successfully validated at a specific position under the mentorship of an already qualified Air Traffic Controller.

Civilian Air Traffic Controllers' licensing is standardised by international agreement through ICAO (International Civil Aviation Organisation). Many countries have Air Traffic Control schools, academies or colleges such as the Aviation Training Academy (ATA) in Johannesburg, South Africa. These student Air Traffic Controllers are recruited with no prior controlling experience and are trained to the required Air Traffic Control standards.

Whenever an Air Traffic Controller starts at a new station or at a new sector within a particular station, they must undergo a period of training regarding the specific beacons and procedures pertaining to that particular station and or sector. This is done via On the Job Training, where the student Air Traffic Controller is on a live position, controlling real aircraft with a fully qualified and trained mentor or instructor also "plugged in" to the sector to give guidance and ready to take over in a second should it become necessary. In South Africa, a student has between 200 and 400 hours to validate on a specific position depending on the sector complexity. Only once he or she is validated (certified as competent), may the student (now an Air Traffic Controller with a certain validation), work alone on that specific position (Van Rooyen, 2011).

Recent years have seen an unavoidable growth of air traffic world-wide. The introduction of larger and faster aircraft together with an increasing number of smaller aircraft has required Air Traffic Controllers to control a greater variety of aircraft types. Despite more efficient equipment in the air and on the ground, Air Traffic Controllers are stretched to their full capacity at times of peak air traffic. In many parts of the world, future air traffic demands are expected to exceed the capacities of current systems. These systems must therefore evolve or be replaced in order to cope efficiently and safely with these higher demands (ICAO, 1993).

3.5 SELECTION AND TRAINING

Air Traffic Control is a very demanding profession and its safety and efficiency highly depends on the type of person who will be selected and trained to perform this work. It is always a good principle to have more candidates available than the number of positions available, as not all candidates will have the necessary skills and abilities to be selected. Due to the fact that not all people have these specific skills and abilities to become Air

Traffic Controllers, there is a world-wide shortage of Air Traffic Controllers and they can be placed in the category of “Scarce Skills”.

Not many people know of the occupation Air Traffic Control and they do not know what it entails and how to become one as it is not a degree that can be studied at a University. National publicity and positive advertising are needed to make people aware of this occupation and to encourage enough suitable candidates to apply. The more rigid the criteria for selection are, the less candidates will be selected as the elimination rate will be much higher. However a high standard is imperative, especially because people`s lives are at risk.

Some standardised tests, which measure human abilities, seem to have some predictive value in the selection of controllers. These include general intelligence, spatial reasoning, abstract reasoning, arithmetical reasoning, task sharing, verbal fluency and manual dexterity. Other information that is also of great significance to the selection process is medical history, knowledge of aviation and educational attainments. Candidates must have had specific subjects, such as English and mathematics at school and must have obtained certain marks for these subjects in order to qualify as a candidate for Air Traffic Control. An interview helps to confirm that candidates can express themselves clearly when they speak and might also reveal how well each candidate relates to other people. The interview should be standardised, structured and fair to all candidates, so that they all have an equal opportunity to be selected.

According to ICAO (1993), the objective of Air Traffic Control training is to ensure that controllers possess the required knowledge, skills and experience to perform their duties safely and efficiently and to meet national and international standards for Air Traffic Control. A controller must be able to understand and assign priorities to the relevant information, to plan ahead, to make timely and appropriate decisions, to implement them and to ensure compliance with them.

Two essential aspects of training are training content and the process of teaching. With regard to training content, it is beneficial to divide the training into a series of courses and phases. These start with basic principles and practices and progress on successful

completion of each phase towards more complex aspects of Air Traffic Control. This ensures that the student Air Traffic Controller will start from the beginning to master the basic principles before more complex principles are added to their existing knowledge of Air Traffic Control.

According to Joubert (personal communication, March 12, 2011) at Air Traffic and Navigation Services Company (ATNS), there are six courses to be successfully completed before qualifying as a fully qualified Air Traffic Controller:

Table 2: Air Traffic Control Courses

SERIAL NR	COURSE NAME	DESCRIPTION	DURATION
1.	Air Traffic and Aeronautical Information Management (AT/AIM) Core Content Course	To develop the knowledge, skills and attitudes required to enable the students to provide a support service to ATS/AIM in the collection, processing, production and distribution of Aeronautical information and to execute the associated duties and responsibilities within the Aeronautical Information Management domain and/or continue with more specific and specialised ATS training.	14 Weeks
2.	Air Traffic Assistant Co-ordinator Course	To provide the students with ATSO (assistant and co-ordinator) knowledge, skills and attitudes to enable them to proceed with validation training at an Air Traffic Service Centre.	4 Weeks
3.	Aerodrome Readiness and Clearance Delivery	To develop the knowledge, skills and attitudes required by the	8 Weeks

SERIAL NR	COURSE NAME	DESCRIPTION	DURATION
	Course	appropriate authority as stipulated for the issuing of an Aerodrome Control Rating and Clearance Delivery Rating.	
4.	Aerodrome Control Rating Course	To develop the knowledge, skills and attitude required by the appropriate authority as stipulated for the issuing of an Aerodrome Control Rating and Clearance Delivery rating.	8 Weeks
5.	Aerodrome Control Advanced Course	To develop the knowledge, skills and attitudes required by a student to commence OJT validation training at an ATSU specified by the employer/sponsor.	6 Weeks
6.	Approach Radar and Procedural Control Or Area Radar and Procedural Control	To develop the knowledge, skills and attitude of the learners to enable them to commence OJT, as an Approach procedural and radar controller and successfully complete the required validation. To develop the knowledge, skills and attitude of the learners to enable them to commence OJT, as an Area procedural and radar controller and successfully complete the required validation.	16 Weeks 16 Weeks

Source: Course Information provided by G.C. Joubert (personal communication, March 12, 2011)

Various teaching methods are used during these courses, including classroom instruction where all theory with regard to aircraft and Air Traffic Control are explained to equip them with knowledge to be able to perform the second method, namely simulation exercises. Real-time simulation exercises are very important because it presents a practical means of training and give the students an idea of what can be expected of the profession when actually working at a specific position after finalising the course. After the successful completion of a specific course, all students need to validate on a similar position. This can be called on-the-job training and this validation is done under the mentorship and coaching of already qualified Air Traffic Controllers in that specific position. The validation of a student is essential because it builds on the student controller's experience of real air traffic while the already qualified Air Traffic Controller is present and can assist any time, should the student experience problems or it gets too busy and the student cannot cope with all the air traffic due to inexperience. On-the-job training also reveals the high standards of professionalism and competence, which the controller must achieve to gain the trust and respect of colleagues.

These qualified Air Traffic Controllers who act as mentors and coaches for the student Air Traffic Controllers, are selected and undergo training called On the Job Training Instructors Course (OJTI). Not all controllers make good mentors and teachers and not all want to be a mentor and a coach to others. Those mentors must want to teach and have the patience and ability to understand that those students are not on the same performance level as they and that they are there to assist in getting them on that level. They must understand that these students are nervous, stressed and are doubting themselves whether they will be able to perform and ensure safe flying, these mentors must often put them at ease and keep them calm while working. These mentors must also be proficient and confident in their own skills and must be able to handle a traffic situation through another person, teaching skills to that student while at the same time maintaining over-all command of the situation – these students must feel safe with these Air Traffic Control instructors/mentors (Joubert, 2011).

According to ICAO (1993), the efficiency of learning also depends on the content and presentation of material attributes and motivation of the student. The content of what is

taught, the sequence in which items are taught, the pace of teaching, the amount of reinforcement, as well as the rehearsal of the taught Air Traffic Control information are very important and make a difference in whether efficient learning does take place.

The proficient controller needs to know and understand:

- How Air Traffic Control is conducted;
- The meaning of all presented information;
- The tasks to be accomplished;
- The applicable rules, procedures and instructions;
- The forms and methods of communication within the system;
- The ways in which responsibility for an aircraft is accepted and handed over from one controller to the next;
- The way in which the aims of various controllers work together so that they support rather than impede each other;
- Which changes or signs could denote system degradations or failures;
- Aircraft performance characteristics and preferred manoeuvring; and
- Other influences on flight and routes, such as weather, restricted airspace and noise.

Training should not only encourage certain actions but also discourage or prevent others. An important part of training is to break bad habits or prevent them from arising. For example, the controller must give priority to an emergency and off-load other tasks. Yet the controller must never focus only on one problem as they then lose the bigger picture which entails the whole air situation for which he or she is responsible. This might entail breaking the habit of concentrating on a single task until it has been completed and forming the new habit of frequent scanning of the radar screen or other displays to check that all is well. Training must encourage this constant scanning and alertness (ICAO, 1993).

It is vital that the controller be capable and confident in handling high levels of traffic so that these tasks do not become excessively demanding or burdensome at a later stage. Training must be related to the maximum handling capacity of the system for which the

controller is being trained. During training things such as bad weather and emergencies must form part of the exercises in order for controllers to gain experience under such circumstances. Training should also prepare the controller for conditions of under loading, when there is little traffic but the control positions must still be staffed and the controller must be alert and be able to detect any unexpected events at once. Training enhances self-confidence through achieved performance. Training which has successfully generated sound knowledge and confidence in applying that knowledge can help to sustain controllers through events (ICAO, 1993).

3.6 SITUATIONAL AWARENESS IN AIR TRAFFIC CONTROL

According to Eurocontrol (2008), Air Traffic Controllers, must be able to multi-task, such as controlling the navigation of several aircraft at the same time, co-ordinating with other Air Traffic Controllers, and performing pre-planning, involving separation of levelled aircraft which are climbing or descending. To cope with all this, Air Traffic Controllers have to have a high attention span but unfortunately it can be affected by stress and fatigue.

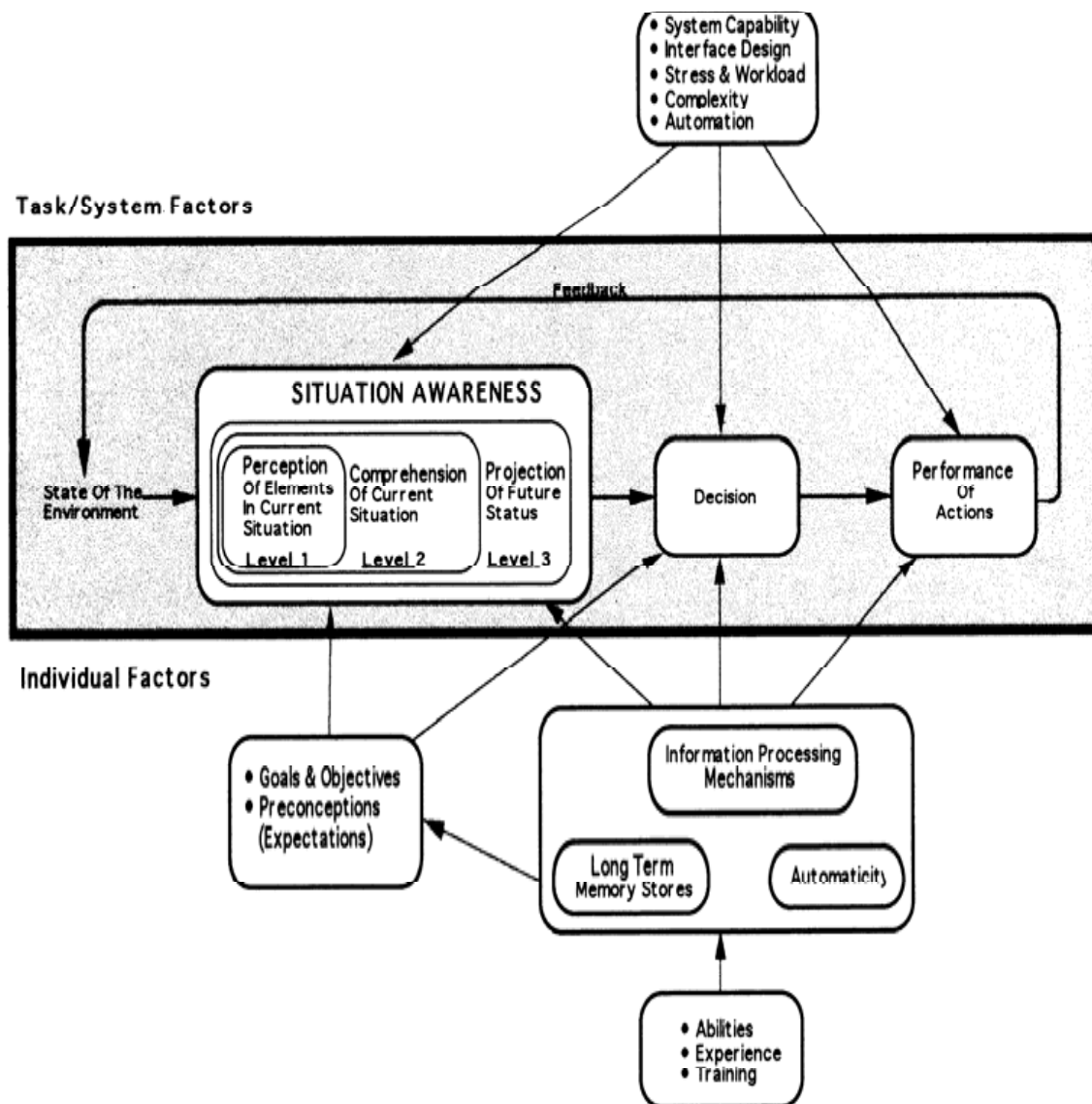
According to Endsley and Rodgers (1994), Air Traffic Controllers are called upon to sort-out and project the paths of an ever-increasing number of aircraft in order to ensure goals of minimum separation and safe, efficient take-off, en route and landing operations. This job relies upon the situation awareness of controllers who must maintain a current “picture” of all the aircraft as they rapidly change location as well as their projected future locations relative to each other, along with other important aircraft parameters such as destination, fuel and speed. Controllers call this “the picture”, which is their mental model of the situation upon which all of their decisions rely. The central skill of the controller seems to be the ability to respond to a lot of information about several aircraft simultaneously and to form a mental picture that changes continuously as the information and location of the aircraft changes and they use it as the basis for planning and controlling the course of the aircraft.

According to AviationKnowledge (2011), “situational awareness is a term used to describe a person’s awareness of their surroundings, the meaning of these surroundings, a prediction of what these surroundings will mean in the future and then using this information to act”. This can be simplified down into three key words: **Look – Think –**

Act. The term “situational awareness” was agreed upon to describe the process of attention, perception and decision-making and together these processes form an Air Traffic Controller’s mental picture of the current air situation. It is important for Air Traffic Controllers to have an exact mental picture of all the aircraft in their airspace when making decisions to ensure that they make the best decisions for aviation safety.

According to AviationKnowledge (2011), there have been many models used to attempt to describe this situation awareness concept. An illustration of Endsley’s model is presented in Figure 7. As the figure illustrates, situational awareness is part cognitive ability and part human activity which ensures a dynamic system. Endsley has indicated how situational awareness is influenced by task factors and individual factors. This explains why two people faced with different tasks factors might arrive at different conclusions, as might people with different abilities, experience and training.

Figure 9: Situational Awareness Model



Source: Situational Awareness in Aviation (2011)

According to AviationKnowledge (2011), the three-level model proposed by Endsley in 1995, already illustrates an increasing degree of awareness as the information is processed at the higher levels.

3.6.1 Level 1 – Perception of Elements in the Current Situation

The first step for Air Traffic Controllers, in achieving situational awareness, involves knowing the position, characteristics and dynamics of all the aircraft in the environment. The Air Traffic Controllers need to accurately know of each of the aircraft in his or her airspace and their relevant attributes (call-sign, airspeed, position, route, direction of flight and altitude), weather, pilot and controller requests, emergency information and other pertinent elements.

3.6.2 Level 2 – Comprehension of Current Situation

Comprehension of the situation is based on a combination of the positions, characteristics, attributes and dynamics of the Level 1 elements. Level 2 of situational awareness is not only about being aware of the elements that are present but to also understand the impact of those elements in light of the Air Traffic Controller's goals. When Air Traffic Controllers know the positions, characteristics, attributes and dynamics of all the aircraft and they collate other information of other elements, such as weather, they are presented with a holistic picture of the environment and they will understand better how to navigate all the various aircraft in the particular weather situation. The Air Traffic Controller needs to put together disparate bits of data to determine the impact of change in one aircraft's flight status on another. This is to ensure that they do not pass each other with too little distance between them or what implication heavy weather will have on all the aircraft as some may need to be diverted to other nearby airports due to fuel shortages. A trainee Air Traffic Controller might have situational awareness by being aware of the elements, but may fall short in the ability to understand how all the elements impact on each other.

3.6.3 Level 3 – Projection of Future Status

Level 3 is the highest level of situational awareness and it entails the ability to project the future actions of the elements in the environment. This is achieved through knowledge of the status and dynamics of the elements and to understand how all of the elements impact on each other and the situation (both Level 1 and Level 2 of situational awareness). For example, the controller must not only comprehend that three aircraft, given their directions

of flight and altitudes, are likely to violate separation rules within a certain period of time, but they must also know where they can safely route one or two of these aircraft in order to avoid these conflicts. This ability gives the Air Traffic Controller the knowledge and time necessary to decide on the most favourable course of action for all aircraft in their sectors (AviationKnowledge, 2011).

According to Endsley and Rodger (1994), while situational awareness can be described as the Air Traffic Controller's knowledge of the environment at a given point in time, it should be recognised that situational awareness is highly sequential in nature. It is not acquired instantaneously but over time. Making use of past experiences on aircraft dynamics and certain conditions, is part of what allows the Air Traffic Controller to project the state of the environment in the near future.

3.6.4 Factors Affecting Situational Awareness

- **System Design**: The system must provide the information in a user-friendly way as this will assist the Air Traffic Controller to access and understand the information quicker and easier which will improve his or her situational awareness.
- **Stress and Workload**: Although Air Traffic Control is a highly stressful job to do, additional stress must be kept to the absolute minimum as stress minimises the capacity to process information. This could significantly affect their situational awareness.
- **Physiological Factors**: Factors such as illness and medication can have a drastic effect on information processing and therefore on situational awareness. Air Traffic Controllers must rather use medicine that does not cause drowsiness, as it will hamper their work effectiveness.
- **Preconceptions**: People often have preconceptions about what is going to happen, they then try and match information to this idea instead of focussing on what is actually going on. If they focus on what they think is going to happen and not on what is actually happening, they will make the incorrect decisions leading to potentially harmful actions, such as not having the full air traffic picture all the time which, can lead to aircraft being directed wrongly leading to incidents or accidents.

- Abilities/Experience/Training: When people are adequately trained for a situation, they will not hesitate to act when those situations actually occur in real life and they will make the right decisions. This is because they have already encountered and been exposed to such a situation even though it was only part of their training. That is why in simulation training, they repeat exercises for Air Traffic Controllers where critical responses are required, such as heavy weather and high traffic volumes (AviationKnowledge, 2011).

3.7 CONCLUSION

Ever since the first Air Traffic Control service was established until now, Air Traffic Control has evolved into a very essential service for airlines and passengers and a very specialised and respected occupation. Air Traffic Control is a 24 hours, 365-days-a-year job and therefore Air Traffic Controllers usually work rotating shifts, including nights, weekends and public holidays.

Civilian Air Traffic Controllers' licensing is standardised by international agreement through ICAO (International Civil Aviation Organisation). Recent years have seen an inexorable growth of air traffic world-wide. The introduction of larger and faster aircraft together with an increasing number of smaller aircraft has required Air Traffic Controllers to handle a greater variety of aircraft types. Despite more efficient equipment in the air and on the ground and more intensive and productive use of the Air Traffic Control system, peaks of air traffic at or near maximum Air Traffic Control system capacity have become more common and more prolonged.

Air Traffic Control is a very demanding profession and its safety and efficiency highly depends on the type of person who will be selected and trained to perform this work. It is always a good principle to have more candidates available than the number of positions available as not all candidates will have the necessary skills and abilities to be selected. Due to the fact that not all people have these specific skills and abilities to become Air Traffic Controllers, there is a world-wide shortage of Air Traffic Controllers and they can be placed in the category of "Scarce Skills".

The primary objective of Air Traffic Control training is to ensure that controllers possess the required knowledge, skills and experience to perform their duties safely and efficiently and to meet national and international standards for Air Traffic Control. During these courses various teaching methods are used, including classroom instruction where all theory with regard to aircraft and Air Traffic Control are explained to equip them with knowledge to be able to perform the second method, namely simulation exercises. Real-time simulation exercises are very important because it is a practical means of training and give the students an idea of what can be expected of the profession when actually working at a specific position after course. After the successful completion of a specific course, all students need to validate on a similar position. This can be called on-the-job training and this validation is done under the mentorship and coaching of already qualified Air Traffic Controllers in that specific position.

This job relies upon the situation awareness of controllers who must maintain a current “picture” of all the aircraft as they rapidly change location as well as their projected future locations relative to each other, along with other important aircraft parameters, such as destination, fuel and speed. Controllers call this “the picture”, which is their mental picture of the situation upon which all of their decisions rely.

CHAPTER 4 – OCCUPATIONAL STRESS IN AIR TRAFFIC CONTROLLERS

4.1 CRITICAL INCIDENT STRESS AND TRAUMATIC STRESS

According to Gordon (1997), “Critical Incident Stress (CIS) is a physical and psychological response to an incident that presents a worker or team with complex, intense or threatening situations and requires the mobilisation of an unusual intensity of emotional energy and professional skill. It causes a high degree of neurological arousal that involves important chemical changes in the brain and behavioural and emotional changes.” During the incident, only the most critical information is processed to assist with dealing with the current situation. While such an incident occurs, a person has no sense of time, he or she forgets about him- or herself and just focuses on the situation and a lot of detail with regard to the incident are overlooked. Due to this, people sometimes cannot really remember what happened and struggle to process the experience and this causes more stress and conflict, as they cannot come to terms with the event.

CIS can take a while to heal. In severe circumstances, such as traumatic stress, which can occur when Air Traffic Controllers are exposed to mid-air collisions between aircraft, it might last weeks and not fully subside for a long time. Normal stress can subside much quicker with the right treatment, such as time off. Unfortunately, recovery from CIS or traumatic stress is slow and complicated and the healing process takes a much longer time. Not every facet of a person’s functioning is affected by the continuing CIS responses, but it may reduce productivity at work, a person may not even enjoy his or her work as much anymore and it may restrict people in their social lives and emotional behaviour and lead to physical illness. Factors that can assist Air Traffic Controllers to reduce the negative impact of CIS on them are for instance, support from their direct supervisors and senior managers, to receive Critical Incident Stress Management (CISM) and to have personal support networks (Gordon, 1997).

Critical Incident Stress is a response that occurs when a person experiences extreme stress caused by an abnormally intense incident. A person still has the ability to overcome CIS but will need assistance to recover. With traumatic stress a person's ability to recover is limited and therefore, he or she will need intense assistance with the recovery process.

CIS is like a sprain which can be less or more severe and is disabling to a person. However, with appropriate rest, it should recover unaided. Traumatic stress on the other hand is like a broken bone that needs intensive treatment to ensure that it heals properly and does not lead to permanent loss of function. This implies that traumatic stress requires intensive and early assistance. It is important that each affected Air Traffic Controller must be assessed and according to the assessments, the correct interventions must be identified and used for each specific individual (Gordon, 1997).

4.2 SYMPTOMS OF CRITICAL INCIDENT STRESS AND TRAUMATIC STRESS

According to Gordon (1997), there is considerable variation in the symptoms of CIS and more personal reactions may occur based on individual factors. Traumatic stress may occur as a more serious and damaging consequence of a very serious incident. Although it is not possible to provide a clear differentiation of these two conditions, some indication to distinguish them is provided below.

Table 3: Symptoms of Critical Incident Stress and Traumatic Stress

SYMPTOMS	CRITICAL INCIDENT STRESS	TRAUMATIC STRESS
Physical	<ul style="list-style-type: none"> * Sweating, trembling, palpitations * Nausea, loss of appetite * Headache or other pains * Excessive fatigue 	<ul style="list-style-type: none"> * Dazed, weak, collapse, hyper-alert, throughout first 24 hours * Excessive fatigue
Behavioural	<ul style="list-style-type: none"> * Restless, jumpy, cannot relax * Sleep disturbance, dreams or nightmares * Increased alcohol, tobacco, caffeine consumption * Slurred or confused speech 	<ul style="list-style-type: none"> * Inability to continue working or other duties, nightmares, sleeplessness * Avoiding reminders, thinking or acting as though it's happening again
Mental	<ul style="list-style-type: none"> * Difficulty concentration * Flashbacks, cannot stop remembering, thinking or being reminded about the event 	<ul style="list-style-type: none"> * Acute confusion, disorientation * Re-experiencing the trauma * Constantly thinking about it * Inability to think about ordinary

SYMPTOMS	CRITICAL INCIDENT STRESS	TRAUMATIC STRESS
	<ul style="list-style-type: none"> * Think the organisation is to blame * Mental pressure, feel as though cracking up 	things <ul style="list-style-type: none"> * Inability to remember what happened
Emotional	<ul style="list-style-type: none"> * Anger, often at the organisation or management * Suspiciousness * Fear of recurrence * Depressed, feel 'down', sadness, tears for unexpected reasons * Guilt: I should have done more, been there * Continuing sadness, irritability, anger, guilt, helplessness * Mood swings, lack of feeling 	<ul style="list-style-type: none"> * Fear, anger, guilt, lack of normal feelings, extreme distress when reminded, irritability * Numbness and dissociation from the incident
Social	<ul style="list-style-type: none"> * Excessive talking about events, or need for support * Cannot communicate to others effectively * Loss of interest in work, feeling detached from others * Wanting contact and reassurance 	<ul style="list-style-type: none"> * Withdrawal, feeling that others don't understand, feeling different, resenting others * Fearing being alone
Existential	<ul style="list-style-type: none"> * Wondering what the point of all is * Sense of self, the meaning of life, and values questioned and may change * Not functioning efficiently since incident * Loss of commitment to job * Decreased work satisfaction, purpose 	<ul style="list-style-type: none"> * Loss of meaning (I'm not the same person as before) * Inability to accept what has happened * Feeling different about life and family

Source: Resource Guide for Critical Incident Stress and Debriefing in Human Service Agencies (1997)

4.3 SOURCES OF STRESS IN AIR TRAFFIC CONTROL

According to Costa (1995), Air Traffic Controllers are generally considered to be one of the most demanding jobs there is. Air Traffic Controllers must have high levels of knowledge and must have a high level of expertise in what they do. They must be able to apply their minds and skills and make decisions in seconds as these decisions impact on thousands of people's lives daily. They must be able to process information very fast and reason logically in order to make these decisions and then also communicate them to other Air Traffic Controllers as well as the pilots of the aircraft.

Research that was done on the complexity of Air Traffic Control by a group of American researchers indicated that Air Traffic Controllers have six main activities to perform. These activities include situation monitoring, resolving aircraft conflicts, managing air traffic sequences, routing or planning flights, assessing weather impact and managing sector/position resources which include 46 sub-activities and 348 distinct tasks. For example, the relevant cognitive/sensory attributes required for high performance levels at radar workstations are spatial scanning, movement detection, image and pattern recognitions, prioritising, visual and verbal filtering, coding and decoding, inductive and deductive reasoning, short-term and long-term memory and mathematic and probabilistic reasoning.

It is therefore safe to say that the cognitive and operational processes of an Air Traffic Controller not only differ according to the number of aircraft under his or her control, but also with the number and difficulty of problems to be solved. The Air Traffic Controller must continuously process new information and change his or her working methods as the air situation changes. For instance, runways that are in use can change momentarily due to the direction of the wind that changed as aircraft must take-off and land into the wind. All these changes and challenges are dealt with in accordance of standardised rules and procedures but they also have to be flexible when the situation demands it.

As illustrated in Table 4, and in accordance with several surveys, the main sources of stress reported by Air Traffic Controllers include the work environment, such as the reliability of equipment and the fact that they sometimes have to bend rules to make certain situations work, as well as the organisational structure. Organisational structure refers to shift work, unfavourable working conditions and the lack of participation in decision-making, especially if it affects them directly (Costa, 1995).

These stress factors all have an influence on job satisfaction as well as the well-being and safety of Air Traffic Controllers. As the number of aircraft increased, Air Traffic Controllers started using procedures which are less time consuming in order to be able to perform their duties in a safe and expeditious way. The number of decisions that Air Traffic Controllers must make presents a stressful condition when the controller's decision-making capacity is stretched to the limit. In case of overload, this can lead to a very risky

situation defined as “loss of picture” whereby Air Traffic Controllers may forget of some of the aircraft due to them having to deal efficiently with so many aircraft at once. On the other hand and ironically, it is frequently reported that many errors often occur during periods where there are less aircraft on frequency to deal with. This points to the great effort required to regulate the psycho-physical reactions, maintaining high levels of arousal and vigilance, even in conditions of “underload” (Costa, 1995).

Table 4: Main Sources of Stress for Air Traffic Controllers

Demand:	<ul style="list-style-type: none"> ➤ Number of Aircraft under control ➤ Peak Traffic Hours ➤ Extraneous Traffic ➤ Unforeseeable Events
Operating Procedures:	<ul style="list-style-type: none"> ➤ Time Pressure ➤ Having to bend the Rules ➤ Feeling of Loss of Control ➤ Fear of Consequences of Errors
Working Times:	<ul style="list-style-type: none"> ➤ Unbroken Duty Periods ➤ Shift and Night Work
Working Tools:	<ul style="list-style-type: none"> ➤ Limitations and Reliability of Equipment ➤ VDT, R/T and Telephone Quality ➤ Equipment Layout
Work Environment:	<ul style="list-style-type: none"> ➤ Lighting, Optical Reflections ➤ Noise/Distracters ➤ Microclimate ➤ Bad Posture ➤ Rest and Canteen Facilities
Work Organisations:	<ul style="list-style-type: none"> ➤ Role Ambiguity ➤ Relations with Supervisors and Colleagues ➤ Lack of Control over Work Process ➤ Salary

Source: Occupational Stress and Stress Prevention in Air Traffic Control (1995)

Furthermore, Air Traffic Controllers are among the groups of workers more exposed to “critical incidents” because they work with aircraft in the air and human lives. Critical incidents are situations which cause unusually strong emotional reactions, such as in the case of air accidents, near collisions or loss of control due to overload. These usually all lead to loss of life or serious injury. The psychic (anger, guilt, grief, anxiety) and physical (hypertension, headache, sweating, heartburn, insomnia) reactions cannot only hamper work performance (poor attention and concentration, impaired thinking and memory), but can also give rise to long-term post-traumatic disorders if no assistance are given to Air Traffic Controller by peers, supervisors/management and professionals (Costa, 1995).

4.4 PREVIOUS STUDY

MacLennan and Peebles (1996) did a study on Air Traffic Controllers in Canada with regard to any health problems experienced by Air Traffic Controllers as well as typical personality traits of Air Traffic Controllers. The study indicated the following:

Air Traffic Controllers are highly trained and a professional occupation whereby, to comply with the selection criteria, candidates need to possess very specific characteristics such as high intelligence, good physical health, a certain level of English proficiency and exceptional spatial scanning abilities. On average only 5% of all applicants pass the selection phase and continue to the training phase. Out of the 5% candidates that get selected and continue with training, only 40% eventually become fully qualified Air Traffic Controllers. This ensures that those Air Traffic Control students with potential become proud and ambitious controllers because they understand that not all people have the abilities to be a competent Air Traffic Controller who ensures the safe air travel of thousands of human beings daily. Air Traffic Controllers need to monitor and process incoming and outgoing information in split seconds and from this information it is expected of them to make fast and accurate decisions with no room for error. All this information processing and decision-making with no time to spare, may lead to Air Traffic Controllers experiencing high levels of stress.

Air Traffic Controllers are seen as intelligent, strong and reserved individuals who are able to control their fear. They tend to be dominant with very little regard for authority as they

are accustomed to make decisions without consulting superiors, as firstly there is no time for consultation, and secondly, some managers have never been Air Traffic Controllers and therefore they will not be able to advise them. When the Air Traffic Controllers completed the 16PF test, they scored higher than the norm on intelligence, ego strength, group conformity, courage, happiness, dominance, being self-sufficient, worrying and compulsivity. They scored lower as the norm on emotional sensitivity, uncertainty and guilt (MacLennan & Peebles, 1996).

According to MacLennan and Peebles (1996), due to the nature of their work it was found that during work hours the controllers only communicate and interact with co-workers as those are the people they relate to in a work environment. As the nature of their work demands of them to work shifts, the interaction between the controllers and family and friends who work normal working hours, can sometimes be strained, reason being that sometimes when family and friends relax, they are working and *vice versa*. Due to this social isolation and the demands of the work, controllers are a close group that are loyal and protective of each other. They possess a lot of respect for each other as well as in their abilities as they are proud to be Air Traffic Controllers.

4.5 TYPE A PERSONALITY

According to Eurocontrol (1996), research strongly indicates that personality is an important factor in the stress response of an individual. It is found that so-called Type A personalities are more prone to stressed reactions than Type B personalities. The Air Traffic Control environment seems fit for people with Type A personality due to the demands of the work. Unfortunately, this personality type attracts and cause a lot of stress and that might also be one of the reasons why Air Traffic Control is seen as such a stressful environment.

Since researchers started studying Type A personality over 50 years ago, it has become a household term. Most people now know that Type A personality characteristics have to do with being competitive and work obsessed and can bring about increased risk of health problems. It is not always understood exactly what traits constitute Type A behaviour or exactly how these traits impact health and well-being (Scott, 2007).

According to Scott (2007), the following characteristics are the hallmark characteristics of Type A behaviour:

- Time Urgency and Impatience – as demonstrated by people who are always working against the clock and never have enough time to complete tasks. They get frustrated while waiting in line, often interrupt others, walk or talk at a rapid pace and are always painfully aware of time and how little of it they have to spare. To determine the presence of time-impatience, the following questions can be asked, “Does it bother you a lot to wait in line at a cashier’s counter or to be seated in a restaurant?” “Do you often think of matters while listening to your partners or others?” and “Do you believe that usually you are in a hurry to get things done?”
- Free-Floating Hostility or Aggressiveness – is recognised as impatience, rudeness, being easily upset over small things or having a “short fuse”. Questions to be asked include: “Do you become irritated when driving or swear at others?” “Do you believe that most people are not honest or are not willing to help others?” and “Does the car-driving errors of other drivers, the indifference of store clerks or the tardiness of waiters upset you significantly?”

Type A behaviour often also includes competitiveness, strong achievement-orientation and high ambitions. Certain physical characteristics often accompanying Type A behaviour due to stress experienced over the years and it includes facial tension such as clenched jaw and tight lips, teeth grinding, and dark circles under the eyes (Scott, 2007).

The following table provides a comparison between some of Type A and Type B personality traits:

Table 5: Personality Behaviour Patterns

TYPE A PERSONALITY	TYPE B PERSONALITY
Very Competitive	Not competitive (at work or play)
Strong, Forceful Personality	Easy-going or retiring
Does things quickly	Methodical or slow in doing things
Strives for Promotion at work or Social Advancement	Content with present position at work or socially
Wants Public Recognition	No desire for public recognition
Angered easily by events and people	Slow to anger
Restless when not active	Enjoys periods of idleness
Speaks Rapidly	Speaks slowly
Seems to thrive on doing more than one thing at a time	Happiest doing one thing at a time
Walks, gesticulates and eats quickly	Walks, gesticulates and eats without rushing
Impatient at any delay	Patient and not upset by delay
Very conscious of time, enjoys having deadlines to meet	Not time-conscious, ignores deadlines
Always arrives on time	Often late
Taut facial muscles and often clenches fists	Relaxed facial muscles and does not clench fists

Source: Human Factors Module Stress (1996)

According to Scott (2007), some of the harmful effects that are common among those exhibiting Type A behaviour are hypertension, heart disease, job stress and social isolation. While many personality traits, such as extroversion are inborn, it is believed that Type A personality characteristics are more of a reaction to environmental factors or tendencies toward certain behaviours and are influenced by culture and job structure, for example:

- Many jobs, such as Air Traffic Control, put heavy demands on time, making it necessary for workers to be very concerned with getting things done quickly, as is the

case with air traffic control where there is little opportunity to carry work forward to the next day.

- Some workplaces deliver heavy penalties on mistakes, so efficiency and achievement becomes extremely important. When Air Traffic Controllers make mistakes, people may die and this cannot be allowed even though it is not intentionally, it remains a burden that the Air Traffic Controller does not want to carry.
- Some jobs, including Air Traffic Control create more stress, making people less patient, more stressed and more prone to Type A behaviour.

Air Traffic Control is without a doubt a challenging and stressful job with high demands and little control over decision-making in various areas related to their work. Many unforeseen factors that are perceived to be insignificant often arise in this workplace, such as weather and noise, that can lead to higher stress levels. Many Air Traffic Controllers feel exhausted from the high demands of the job, intense mental work, constant vigilance and concentration required by their jobs (ITF, 2009).

4.6 COPING MECHANISMS

According to Eurocontrol (2004), coping is the set of cognitive and behavioural efforts aimed at controlling, reducing or tolerating the internal or external demands that threaten or exceed an individual's resources. Coping may be focused either on solving the problem or on the emotions.

Individuals will develop different coping strategies and thus react differently towards the environment whether he or she is in an isolated stress phase due to an increased workload, is experiencing chronic stress due to an accumulation of damaging events, or is in a state verging on post-traumatic stress. Coping strategies, such as prevention, avoidance, attack and calming actions, resulting from specific learning are often referred to although some aspects of coping are not happening in conscious state. These are defence mechanisms, such as denial, moving, intellectualisation and aggressiveness towards others, that are independent from learning processes but which are instinctive to human behaviour (Eurocontrol, 2004).

4.6.1 Critical Incident Stress Management (CISM) in Air Traffic Control

One way of assisting with counselling is through Critical Incident Stress Management (CISM). According to Costa (1995), “a critical incident is any line of duty that causes employees to experience unusually strong emotional reactions that could interfere with their ability to function either at the scene or later”. When an aircraft accident occurs, even if it is no fault of the Air Traffic Controller, it is also very traumatic for him or her and he or she may lose self-confidence, disabling him or her to perform the job. CISM is the manner in which stress is handled after critical incidents. Air Traffic Controllers who experience the effects of stress reactions and do not receive CISM, may be left with impairments.

Critical Incident Stress Management (CISM) is an all-inclusive, integrated, methodical and multi-component crisis intervention programme. It was developed to help manage traumatic experiences within organisations and communities. CISM is neither a form of psychotherapy, nor is it a substitute for psychotherapy. CISM is a “package” of crisis intervention tactics that are strategically woven together to:

- Reduce the impact of a traumatic event;
- Facilitate a recovery processes in people who are having normal reactions to traumatic events;
- Assist individuals, groups and organisations to function effectively again in the workplace and elsewhere; and
- Identify people within an organisation who need a little more assistance in coping, even if it means a referral for further evaluation and possibly psychological treatment (Mitchell, n.d.).

Some coping strategies can assist an Air Traffic Controller when an incident occurs and enable the person to function well. Some of the most common coping strategies are:

- Having a specific tasks to perform during the incident;
- To be mentally prepared for the risks;

- Switching off emotions as emotions can get in the way of good judgment;
- Keeping active to stop thinking;
- Interacting with colleagues;
- Avoiding thinking of the consequences and handle the situation;
- Keeping a narrow concentration on the most important things;
- Knowing that a person has done a good job;
- Knowing how to handle the situation by having the necessary skills and training;
- Knowing your limits;
- Understanding the reasons why the incident occurred; and
- Accepting the limits of the job.

Critical Incident Stress can affect three groups of people. In an aviation disaster, there are the passengers and crew of the aircraft who are directly exposed. Then there are the observers, Air Traffic Controllers and emergency personnel who are not directly part of the critical incident but do play a role. At a later exposure there are spouses, family and close friends. It is not to say that if Air Traffic Controllers are not directly exposed to the aviation disaster, it would not matter to them, as they may experience feelings of guilt even if they were not affected directly such as the pilots, crew and passengers. Each victim experiences the disaster differently but it affects everyone involved. People who are identified to assist these victims, such as doctors and psychologists, must preferably have knowledge and an understanding of Air Traffic Control in order to truly be able to assist them and to understand all the emotions and trauma they go through. Management of an organisation is responsible for company policy and must actively support CISM and ensure that policies are updated with regard to stress management interventions for employees (Eurocontrol, 1997).

A stress reaction to a critical incident is more acute than day-to-day stress. Healthy diets, exercise, humour and relaxation help a lot in fighting stress. Should a critical incident occur, it is important that the Air Traffic Controller seek assistance through CISM and more important is the support that the organisation must give this individual by ensuring that CISM is available to Air Traffic Controllers especially as they work in such a highly stressful environment.

For Air Traffic Controllers to be able to do their job efficiently and to handle all the stress, they must possess some personality characteristics which assist them with it such as to be decisive, to remain calm and in control under difficult circumstances, the ability to concentrate and to be internally motivated. When Air Traffic Controllers experience stress after a critical incident, it affects each one differently as they cope differently with it. These stress reactions may lead to anxiety, loss of self-confidence and loss of concentration. These reactions are described as “**Normal reactions of a normal person to an unusual occurrence**”, however they are reactions which Air Traffic Controllers cannot afford. It cannot be afforded due to the fact that these reactions disable them to do their job efficiently. It is contradicting to their characteristics and therefore, it will impair the image that they have of themselves. Air Traffic Controllers will not necessarily ask for help, as it is seen as a weakness. Therefore these stress reactions must be identified early in order for it to be adequately addressed, otherwise it may lead to long-term impairment or even Post Traumatic Stress Disorder. PTSD may well lead to occupational invalidity. It is therefore extremely advisable that methods and programmes are available to assist Air Traffic Controllers and that they accept the assistance and support provided (Eurocontrol, 1997).

Peers whom are colleagues of the same profession, and who have been trained in this method, should carry out CISM. The Air Traffic Controller therefore feels that he or she is understood and that the peer can understand his reactions. Those concerned are accepted by their peers and the CISM dialogue is welcome. The strange thing in Air Traffic Control is that after a critical incident, usually nothing happens which could be interpreted as an accident or disaster by the outside world. This means that not only mid-air collisions causes stress for Air Traffic Controllers but even something such an infringement of separation, which is a critical incident for an Air Traffic Controller can thus lead to stress reactions. It is best when CISM is offered by people who are very familiar with Air Traffic Control as it may otherwise lead to mistrust. The Air Traffic Controllers will feel that they, their profession and its demands as well as their reactions are not understood and therefore they will feel as if they are not effectively assisted (Eurocontrol, 1997).

According to Leonhardt (2010), CISM can be conducted by means of debriefing or defusing by the peers to an Air Traffic Controller whom has experienced a critical incident. With debriefing, peers are required to conduct an interview with the specific Air Traffic Controller to begin with a reassuring and impersonal level of facts. After the facts have been acquired, the peer will then start asking the Air Traffic Controller on his or her personal thoughts on the incident and then slowly move to the sensitive level of where they talk about the emotions involved for the Air Traffic Controller. After these emotions have been explored, the interview will lead to the level of objective explanations of psychological states and back. After all the information has been gathered during the interview process, the Air Traffic Controller will be asked about his or her current feelings on the incident to establish if progress was made. Defusing can also be used as a method of CISM. With defusing, the idea is to enable an individual to talk about what he or she experienced during a serious occurrence before he or she has time to rethink the event, in order to avoid a possible negative interpretation of it.

CISM is a tool that can be used to assist Air Traffic Controllers to find their own coping mechanisms as quickly as possible in order to cope with the reactions stemming from the incident to avoid PTSD. While busy with CISM, past problems must be excluded from all discussions as the focus must be on the last critical incident which caused the stress reactions. The trainer should be certified and have the required experience in stress management and Air Traffic Control. In order to be successful, this programme requires a clear concept and objective and it has to be supported by both operational staff and management (Leonhardt, 2010).

According to Eurocontrol (1996), there are different important components of the CISM programme that must be in place to ensure its success:

- A peer support team – the keystone of the CISM programme is that peers must be involved and correctly trained.
- Debriefing specialists (mental health professionals) – specialists (psychiatrists and psychologists) who are specially trained in Critical Incident Stress Debriefing (CISD). These specialists are part of the peer support team and are in charge of

training them, of providing ongoing courses and information and of carrying out debriefing sessions, if necessary.

- Previously established protocols – a true CISM handbook that establishes the aims and objectives of the introduction of CISM, together with the structure and needs of the programme. This document is very often signed by management, which indicates its support for this programme.
- Education and information – Air Traffic Controllers should be informed of the availability of this programme and if possible, how it can help an individual.
- Defusing – mostly used in the specific CISM-ATC programme. The fact that the person conducting the interview is a peer who knows the operational constraints will make the verbalisation of the facts and that of the emotions easier.
- Debriefing – this is used for serious incidents or accidents. CISD is structured and is normally conducted in groups and by specialists.
- Follow-ups – peers are in charge of making contact with the individuals who have participated in a session (defusing or debriefing) to ensure that all is well with the individual and that he or she is coping.
- External support (Referral service) – sometimes peers are unable to deal with the reactions of the individuals and therefore it is very important to work with specialists, who can relieve the peers and provide more suitable treatment at any time when needed.
- Peer consultations – peers who have conducted defusing or debriefing sessions (together with specialists) need to hold discussions with other members of the CISM support team in order to improve working conditions for Air Traffic Controllers in order to reduce the number of incidents and accidents.
- Refresher training – the peers must be trained and kept up to date on the latest CISM techniques.
- Specific intervention – not only critical incidents cause stress-related reactions and therefore peers must also be able to give adequate support by referring the individual to a source of external support.
- Appraisal – an appraisal of the programme must be made in order to guarantee the effectiveness of the programme.

4.6.2 Relaxation Techniques

According to Eurocontrol (1996), relaxation is important as it takes a person away from the excitement and experiences of everyday. It calms a person down and gives perspective on who he or she is and what their priorities are.

Relaxation is not difficult, all that people need to do is to block out any distractions and focus on the act of relaxing. They can still attend to all the important matters that occupy their minds, but only after they have given themselves some much needed time to relax and “switch off”. In order for relaxation to work, they need to be in a quiet, darkened place without disturbance, where ideally, they can lie down comfortably, full-length. Mental and bodily awareness are crucial in relaxation, they can only change if they know how they feel. They must nestle down and settle their body so that it feels limp. For people to feel tense or nervous and to have their heads full of thoughts is quite normal, but whilst practicing relaxation, they will learn to focus only on the relaxation and nothing else.

4.6.3 Autogenic-Type Exercise

According to Eurocontrol (1996), true autogenic exercises need to be taught by a special teacher or practitioner, well versed in this excellent system. The autogenic methods are a combination of relaxation techniques and meditation techniques. The exercises involve the use of specific, verbalized messages, such as “I am relaxed and at peace with myself”, to focus awareness on a particular area. No effort is involved, but simply a passive concentration on any sensations or emotions, which may result from each message. Imagination or auto-suggestion has been found to have definite physiological effects. By combining a sequence of autogenic (self-generated) instructions with the passive, focused aspect of meditation techniques, a powerful method of self-help has been created. Persistence, patience and a total lack of urgency is all that is necessary for this method to lead to a decrease in muscular tension and a sense of calm and well-being. A 'side-effect' of this particular method is frequently experienced in terms of much improved peripheral circulation, such as an end to cold hands and feet.

4.6.4 Understanding Sleep

Sleep is another form of relaxation and a great healer as it rejuvenates the body, clears emotional conflicts and helps a person to think and work at top efficiency. Many of the ideas and philosophies about sleep are not accurate and therefore it remains a mystery despite all the research about it. After people fall asleep, they do not go into a deeper sleep until he or she reaches some 'deep sleep bottom'. Deep sleep and a light slumber are equally beneficial to a person. People do not always need eight hours a night to remain well, energetic and fresh looking as the amount of sleep people do need will vary enormously from person to person and depend on circumstances. In order to accurately calculate the amount of sleep a person needs, energy levels during the course of the day, sleep disturbances or being worried about anything must be taken into account as well a person's diet and eating habits. For instance, a rich or heavy meal late in the evening could well cause indigestion and stimulants like tea, coffee or alcohol can cause a person to wake in the early hours. Sleep provides people with a balanced system of well-adjusted hormones, as many hormones are concealed into the body at night. The practice of relaxation during the time before going to bed will also be beneficial. It is important not to worry about sleeplessness when the body is not yet ready to go to sleep, just lie quietly or even do some low stress activity, such as reading or listening to relaxing music. Other aids to sleeping include a milky drink, a lukewarm bath, but avoid hot water, as this can be too stimulating to the heart (Eurocontrol, 1996).

4.7 CONCLUSION

Critical incident stress (CIS) "is a physical and psychological response to an incident that presents a worker or team with complex, intense or threatening situations, and requires the mobilisation of an unusual intensity of emotional energy and professional skill". Normal stress responses, usually rapidly subside when time off or other rest and recreational activities are undertaken, it is common for CIS or traumatic stress responses to remain active or recur for long periods.

The Air Traffic Control environment seems fit for people with Type A personalities due to the demands of the work but unfortunately, this personality type causes a lot of stress and that might also be one of the reasons why Air Traffic Control is seen as such a stressful environment. Without a doubt, Air Traffic Control is a challenging and stressful job with high demands and little control over decision-making in various areas related to their work. Meanwhile many unforeseen factors that often arise in their workplace, such as weather and noise, can lead to increased stress. Many Air Traffic Controllers feel drained from the high demands, intense mental work, constant vigilance and concentration required by their jobs.

One way of assisting with counselling is through Critical Incident Stress Management (CISM). CISM is the psychological handling of stress reactions after critical incidents. CISM is necessary since many active controllers have experienced the effects of stress reactions, which have not or insufficiently been coped with – either by themselves or by their colleagues – and many are left with impairments. Should a critical incident occur, it is important that the Air Traffic Controller seeks assistance through CISM. More important is the support that the organisation must give this individual by ensuring that CISM is available to employees in such a highly stressful environment.

If stress reactions are not adequately handled, they may lead to long-term impairment, in the worst case even to a Post-traumatic Disorder (PTSD). For Air Traffic Controllers, a PTSD will lead to occupational invalidity. CISM can be conducted by means of debriefing or defusing by the peers to an Air Traffic Controller whom has experienced a critical incident. CISM is neither a therapy nor a replacement for therapy, it is a crisis intervention model designed to help those concerned to find their own coping mechanisms as quickly as possible in order to cope with the reactions in connection with the incident.

Other ways of assisting with stress management are relaxation techniques which are not difficult, all that people need to do is focus on the act of relaxation and ignore all those distractions. Autogenic-Type Exercises can also be used as well as understanding sleeping and trying to get the best possible rest in for the body to recover and recuperate.

CHAPTER 5 – METHODOLOGY

5.1 INTRODUCTION

The aim of this chapter will be to describe and give an understanding of the different steps taken to conduct the study. The research approach or strategy will be shared firstly followed by the population or participants, their distinctive characteristics and representativeness. The chosen measurement instrument, namely the Experience of Work and Life Circumstances Questionnaire was utilised and will be discussed and evaluated. The steps taken and embarked upon to collect the data relevant to the aim of the study will be described as well as the statistical analysis used in this study. The researcher also endeavours to provide an opinion of the reasons for the responses.

5.2 RESEARCH STRATEGY/APPROACH

In the foregoing chapters it was clearly demonstrated that the work performed by Air Traffic Controllers is extremely demanding and challenging, as indicated by the fact that many controllers retire before their actual retirement with stress-related work disabilities. Sustained high vigilance is required for successful Air Traffic Control work. Errors in judgement can be disastrous, but luckily is very uncommon. When taking all of this into consideration, It is not surprising, that Air Traffic Controllers have a high risk of hypertension (Ming et al. 2004).

This study examined the stressors to Air Traffic Control and how it affected their work performance and therefore a quantitative strategy of inquiry was chosen by making use of The Experience of Work and Life Circumstances Questionnaire (WLQ) that was completed by Air Traffic Controllers. Quantitative research inquires about the relationships among variables that the researcher seeks to know, or it predicts relationships among variables such as what the stressors are and in what capacity it influences Air Traffic Control.

In this study, a sample of Air Traffic Controllers was used to establish their opinions on what causes stress and the trends and attitudes on how it affects their work performance.

As people are very different and different things causes stress to different people and all cope with stress in various ways, the information gathered from the sample was then generalised to the Air Traffic Control population.

5.3 POPULATION

The population consisted out of all the Air Traffic Controllers working in South Africa in the civilian sector. Males and females and all races available to the occupation of Air Traffic Control were represented. The population comprised of about 300 Air Traffic Controllers at the time when the questionnaires were presented to them after approval was given by Air Traffic and Navigation Services Company (ATNS) to do research within the organisation. Hard copies of The Experience of Work and Life Circumstances Questionnaire were distributed to all stations via the Human Factors office of ATNS. The Air Traffic Controllers were requested to complete the questionnaire on hard copy and then to submit it when finalised.

5.4 MEASUREMENT INSTRUMENT

To collect data for this study, a questionnaire with structured questions was used. The Experience of Work and Life Circumstances Questionnaire was released in 1991 and was specifically developed to meet the need for a stress related questionnaire that was standardised for South African circumstances. The questionnaire thus attempts to measure not only the levels of stress but also the causes of stress.

The Experience of Work and Life Circumstances Questionnaire (WLQ) was developed to determine the level and causes of stress in respect of employees whose reading and writing skills are at least on a Grade 10 level. Information about a person's level and causes of stress can be applied for analytical purposes, firstly to determine whether the respondent experiences normal, high or very high levels of stress and secondly to establish the factors that cause the level of stress that are experienced and to identify problem areas.

5.4.1 Administering the Questionnaire

Groups of people as well as individuals, who are employed, can complete The Experience of Work and Life Circumstances Questionnaire (WLQ). There are no restrictions on the size of the groups, except that the room should be large enough to accommodate all the testees and prevent any inconvenience or disturbances, if all the candidates are assessed all at once.

The questionnaire usually takes approximately 25 – 30 minutes to complete, usually everybody finishes within 45 minutes, but there is no time limit set for the WLQ. The questionnaires were completed anonymously in order to ensure confidentiality as well as the co-operation of the Air Traffic Controllers. The information was handled in a strictly confidential manner.

5.4.2 The Structure of the Questionnaire

The WLQ consists out of the following four sections:

- Section A: Background information with regard to the person. Questions 1 to 7 are used to get information from the respondent such as age, sex, amount of dependents and qualifications.
- Section B: The level of stress. The section is used to establish whether the respondent's level of stress is normal, high or very high. The questions are answered by means of a Five Point Scale. A high score indicates a high level of stress that is experienced by the respondent.
- Section C: The causes of stress outside the work situation. These questions are also answered by means of a Five Point Scale. Circumstances outside the work environment can include family problems, financial circumstances, health and the political and economic climate of the country.
- Section D: The causes of stress within the work situation. These questions are also answered by means of a Five Point Scale. Circumstances within the work situation can include organisational functioning, task characteristics, physical working

conditions, career matters, social matters and remuneration, fringe benefits and personnel policy (Van Zyl and Van der Walt, 1991).

5.4.3 The Five Point Scale

The Five Point Likert Scale used in the Experience of Work and Life Circumstances Questionnaire is:

1 = Virtually Never

2 = Sometimes

3 = Reasonably Often

4 = Very Often

5 = Virtually Always

5.5 DATA COLLECTION PROCEDURE

Based on the fact that there is a limited number of Air Traffic Controllers in South Africa and taking into consideration that they are not particularly fond on completing questionnaires, as many as possible questionnaires were made available for them to complete. These questionnaires were available in hard copy throughout South Africa as all Air Traffic Controllers, working at all stations, were taken into consideration in order to establish whether the work place contributes to the stresses of an Air Traffic Controller.

The Human Factors office distributed the questionnaires to all the Air Traffic Controllers and the questionnaires could be completed on a voluntary basis and anonymously. A total of 124 questionnaires were returned and could be used for this study.

5.6 DATA ANALYSIS PROCEDURE

The scores for the different subdivisions were calculated and scored by hand. The scores include those for levels of stress, causes of stress arising outside the organisation as well as inside the organisation consisting out of organisational functioning, task characteristics, physical working conditions and job equipment, social as well as career matters and remuneration, fringe benefits and personnel policy.

5.6.1 The Level of Stress

The score for this part of the questionnaire is obtained by determining the aggregate of the answers (Item 1 – 40 under Scale A).

5.6.2 The Causes of Stress

The causes of stress are divided into two groups: causes arising outside and causes originating within the work situation.

5.6.3 Causes arising outside the work situation

The score for this scale (causes outside the work situation indicated as causes of stress) is obtained by determining the sum of the answers to items 8 to 23 (under Scale B).

5.6.4 Causes originating within the work situation

Circumstances and expectations are grouped together for the purpose of scoring the questions on causes arising within the work situation.

The details of the items in the different subdivisions are as follows:

- Organisational Functioning – Scale B Item 1 and Scale C Item 1, 18, 21, 40, 41, 45 and 52.

- Task Characteristics – Scale B Item 2 and Scale C Item 3, 4, 5, 6, 8, 17, 19, 20, 27, 28, 39, 42, 46 and 47.
- Physical Working Conditions and Job Equipment – Scale B Item 3 and Scale C Item 9, 22, 23, 24, 29, 34 and 37.
- Career Matters – Scale B Item 4 and Scale C Item 10, 11, 12, 26, 33, 43, 48 and 51.
- Social Matters – Scale B Item 5 and Scale C Item 14, 15, 30, 31, 44, 50 and 53.
- Remuneration, Fringe Benefits and Personnel Policy – Scale B Items 6 and 7 and Scale C Items 2, 7, 13, 16, 25, 32, 35, 36, 38 and 49.

The scores for each subdivision is obtained by adding up the scores for the items under Scale C, and then subtracting from this sum the score for the item under Scale B (or the sum of the scores in the case of remuneration, fringe benefits and personnel policy) (Van Zyl et al., 1991).

The statistical techniques that will be used are as follows:

5.6.5 Descriptive Statistics

Descriptive statistics are used to describe the data that was gathered during the study. It provides simple summaries about the sample (Air Traffic Controllers) and the measures (the levels and causes of stress). This descriptive study utilised a voluntary sample of 124 Air Traffic Controllers working at Air Traffic and Navigation Services Company (ATNS). The descriptive statistics comprise frequencies and percentages and are reported in one- or two-way tables. The information displayed in these tables is viewed as management information and will be treated as such, hence a comparative component in the data analysis is superfluous.

CHAPTER 6 – RESEARCH RESULTS

6.1 INTRODUCTION

In this chapter focus will be on revisiting the aims of the study, followed by the presentation of the results based on the questionnaires completed by the Air Traffic Controllers in the sample.

6.2 DEMOGRAPHIC RESULTS

In order for data to be analysed statistically, it first have to be composed, coded, condensed and processed where after the findings can be incorporated into a final report. For the current study the results are as follows:

Table 6: Populations Distribution

There are approximately 300 Air Traffic Controllers working at Air Traffic and Navigation Services Company in South Africa. Questionnaires (150) were distributed to these Air Traffic Controllers throughout South Africa during September and October 2011.

The following table represents the overall response ratio acquired:

DESCRIPTION	TOTAL NUMBER OF EMPLOYEES	NUMBER OF WLQ SEND OUT	NUMBER OF RESPONSES	PERCENTAGE OF RESPONSES
Air Traffic Controllers in South Africa	300	150	124	83%

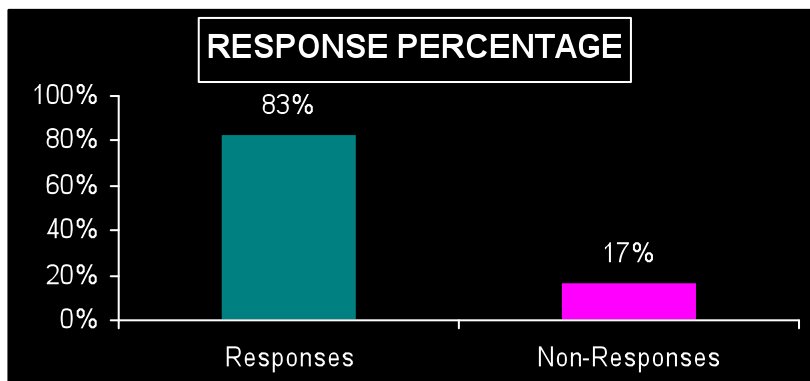
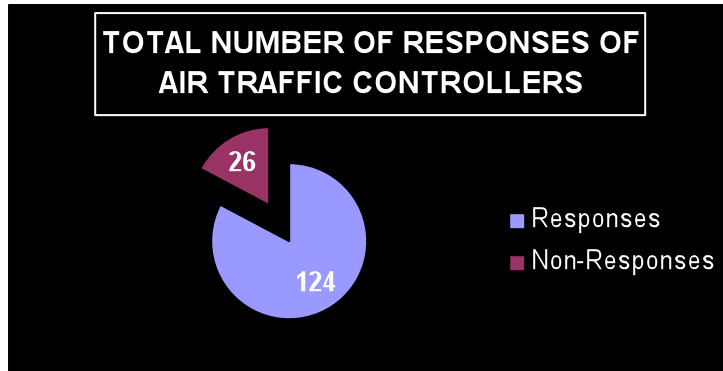


Table 7: Gender Distribution of Respondents

The following table represents the gender distribution of the respondents relative to the overall responses.

DESCRIPTION	NUMBER OF RESPONSES	PERCENTAGE RELATIVE TO RESPONSES
Male	91	73%
Female	33	27%

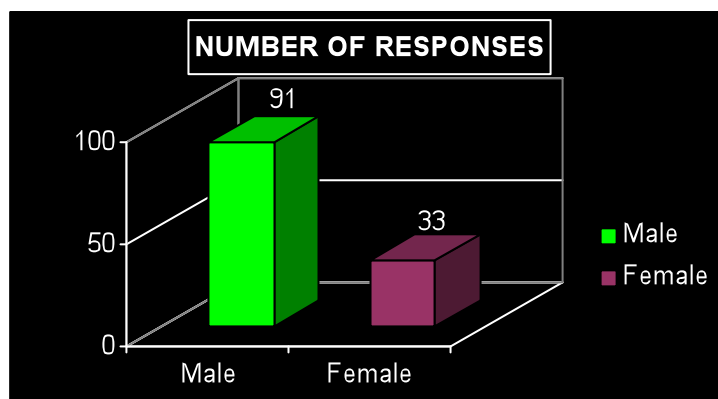


Table 8: Respondent Distribution by Age Interval

The following table represents the age distribution of the respondents relative to the overall responses:

DESCRIPTION	NUMBER OF RESPONSES	PERCENTAGE RELATIVE TO RESPONSES
30 and below	62	50%
31 – 40 years	40	32%
41 – 50 years	17	14%
51 – 60 years	4	3%
Above 60 years	1	1%

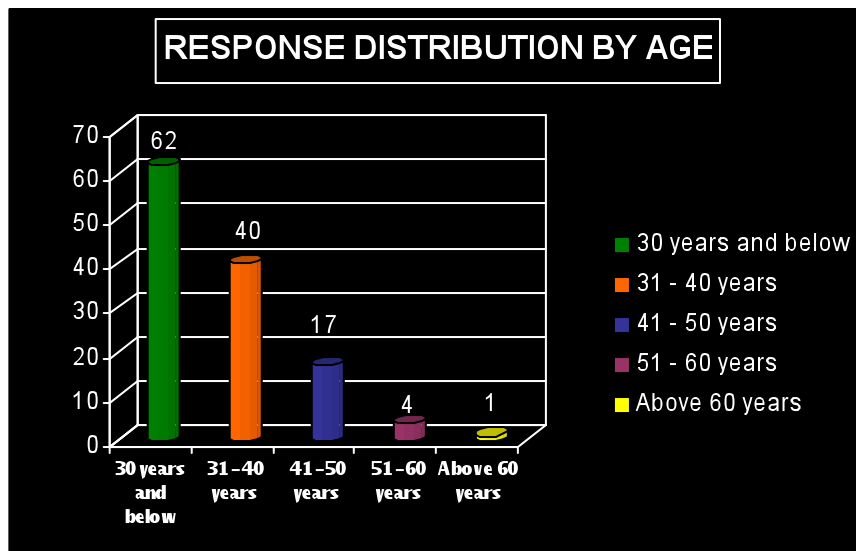


Table 9: Marriage Status of Respondents

The following table represents the marital status of the respondents relative to the overall responses:

DESCRIPTION	NUMBER OF RESPONSES	PERCENTAGE RELATIVE TO RESPONSES
Married	55	44%
Unmarried	69	56%

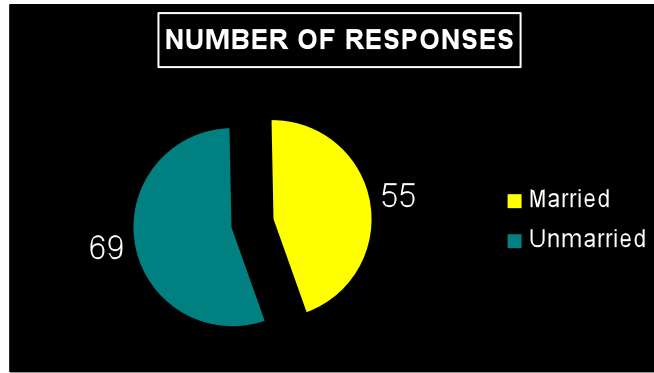


Table 10: Qualifications of Respondents

The following table represents the levels of qualifications of the respondents relative to the overall responses:

DESCRIPTION	NUMBER OF RESPONSES	PERCENTAGE RELATIVE TO RESPONSES
Grade 12	70	56%
Graduate/Diploma	32	26%
Post Graduate	22	18%

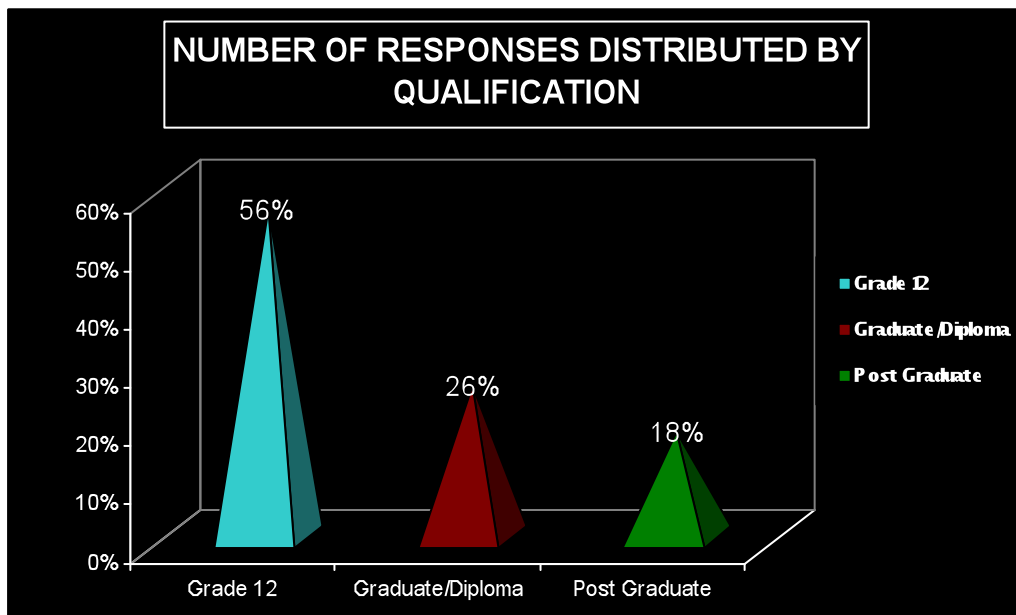


Table 11: Job Levels of Respondents

The breakdown of the job levels of the respondents relative to the overall responses in the acquired organisation is given in the table below:

DESCRIPTION	NUMBER OF RESPONSES	PERCENTAGE RELATIVE TO RESPONSES
ATCO 1	40	32%
ATCO 2	16	13%
ATCO 3	68	55%

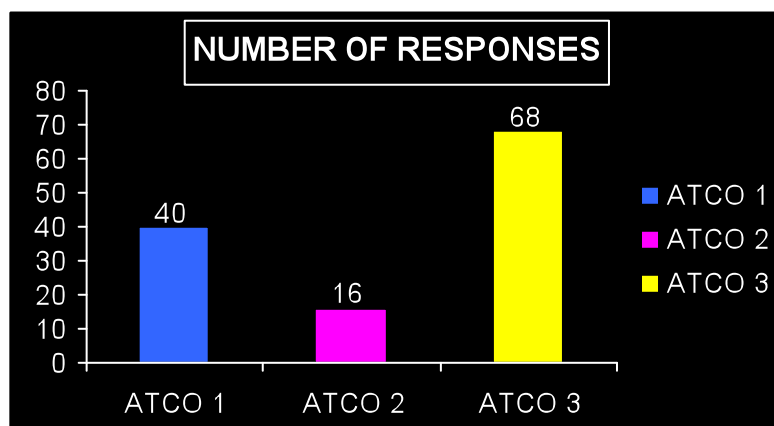


Table 12: Centre Distribution of Respondents

The following table provides the centre distribution of the respondents relative to the overall responses:

DESCRIPTION	NUMBER OF RESPONSES	PERCENTAGE RELATIVE TO RESPONSES
Bloemfontein	9	7%
Port Elizabeth	14	11%
Johannesburg	37	30%
Durban	6	5%
Cape Town	11	9%
East London	4	3%
Lanseria	7	6%
Mafikeng	3	2%

Kimberley	8	7%
Virginia	7	6%
Polokwane	4	3%
Grand Central	5	4%
Rand Airport	5	4%
Pietermaritzburg	4	3%

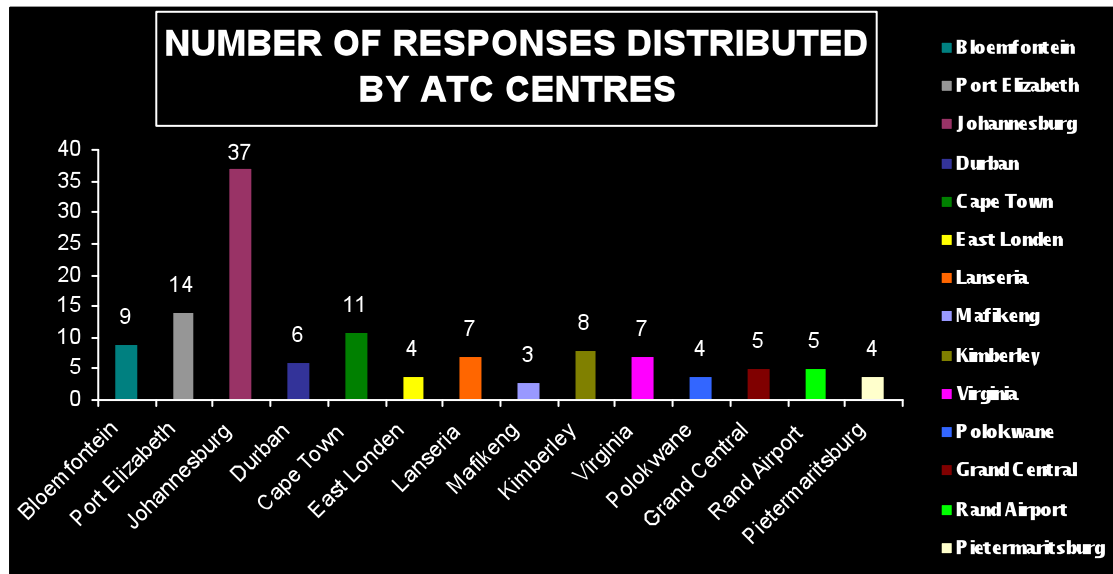
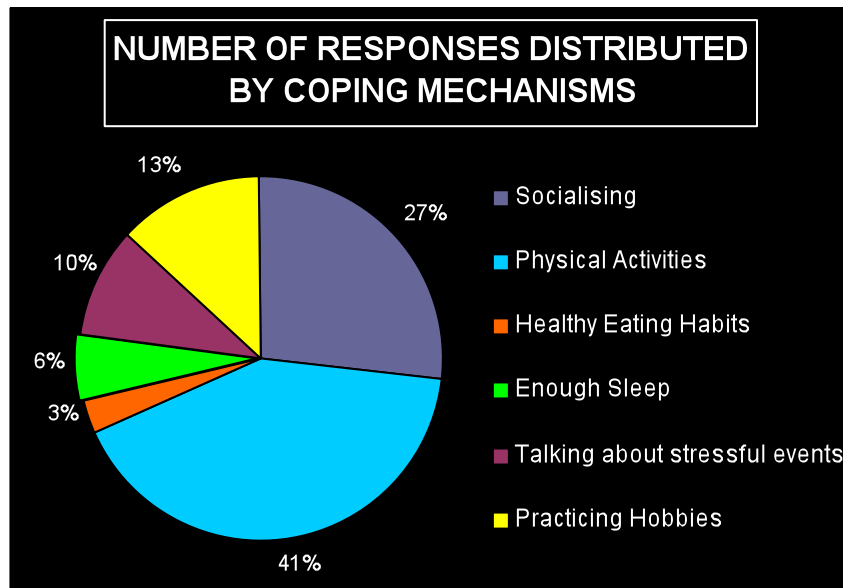


Table 13: Distribution of Respondents by Coping Mechanisms

The following table provides the coping mechanisms` distribution of the respondents relative to the overall responses:

DESCRIPTION	NUMBER OF RESPONSES	PERCENTAGE RELATIVE TO RESPONSES
Socialising	33	27%
Physical Activities	51	41%
Healthy Eating Habits	4	3%
Enough Sleep	7	6%
Talking about stressful events	13	10%
Practicing Hobbies	16	13%



6.3 SUMMARY OF RESPONDENTS' DEMOGRAPHICS

The above demographic characteristics of the 124 respondents can be summarised as follow:

- 73% of the respondents are male.
- 50% of the respondents are 30 years of age and younger.
- 56% of the respondents are unmarried.
- 56% of the respondents have a grade 12 qualification.
- 55% of the respondents are ATCO 3 level, which is the highest level for Air Traffic Controllers before entering management.
- The Johannesburg Centre is not only the busiest centre in South Africa but also represents the Air Traffic Control Centres with the highest number and percentage of responses in terms of the overall response rate with 30%.
- 41% of Air Traffic Controllers reduce their stress levels by participating in physical activities.

6.4 DISTRIBUTION OF STRESS AND CAUSES OF STRESS INSIDE AND OUTSIDE THE WORK SITUATION IN RELATION TO DEMOGRAPHIC VARIABLES

The distribution and causes of stress inside and outside the work situation are illustrated in terms of the following sections:

- Air Traffic Controllers overall
- Gender
- Age Bands
- ATC Centres
- Post Levels
- Educational Categories
- Marital Status

Table 14: Distribution of Stress and Causes of Stress by Air Traffic Controllers

LEVEL	STRESS LEVELS	CAUSES OUTSIDE WORK SITUATION	CAUSES IN THE WORK SITUATION					
			ORGANISATIONAL FUNCTIONING	TASK CHARACTERISTIC	PHYSICAL WORKING CONDITIONS	CAREER OPPORTUNITIES	SOCIAL MATTERS	REMUNERATION AND EMPLOYEE POLICIES
NORMAL	85%	91%	63%	85%	65%	63%	76%	45%
HIGH	9%	8%	22%	8%	18%	19%	15%	15%
VERY HIGH	6%	1%	15%	7%	17%	18%	9%	40%

The most prominent points from Table 14 are the following:

- Air Traffic Controllers overall experience mostly normal levels of stress. This may be due to the fact that Air Traffic Controllers have a passion for aviation, the work they do and that they really enjoy the work. It may also be as a result of Air Traffic Controllers being so used to perform their duties, making decisions and handling all

situations and therefore they may not perceive to have stress, as it is part of their daily functioning within the work situation.

- Air Traffic Controllers experience elevated levels of stress with regard to remuneration and employee policies; 40% experience very high levels of stress and 15% high stress levels, which is much higher than the 45% that only experience normal levels of stress in this regard. This outcome can be contributed to the fact that there is a huge shortage of Air Traffic Controllers and that not anyone is able to become an Air Traffic Controller. Another contributing factor may be the fact that internationally, Air Traffic Controllers are paid more with better employee benefits, such as in the UAE.

Table 15: Distribution of Stress and Causes of Stress by Gender

LEVEL	GENDER CATEGORY	STRESS LEVELS	CAUSES OUTSIDE WORK SITUATION	CAUSES IN THE WORK SITUATION					
				ORGANISATIONAL FUNCTIONING	TASK CHARACTERISTIC	PHYSICAL WORKING CONDITIONS	CAREER OPPORTUNITIES	SOCIAL MATTERS	REMUNERATION AND EMPLOYEE POLICIES
NORMAL	MALE	84%	91%	59%	84%	69%	63%	79%	43%
	FEMALE	88%	91%	49%	73%	55%	61%	67%	49%
HIGH	MALE	9%	8%	23%	8%	16%	22%	13%	14%
	FEMALE	9%	9%	30%	15%	24%	15%	21%	15%
VERY HIGH	MALE	7%	1%	18%	8%	15%	15%	8%	43%
	FEMALE	3%	0%	21%	12%	21%	24%	12%	36%

The most prominent points from Table 15 are the following:

- As can be seen in this table, both male and female employees experience more or less the same levels of stress in all the categories.

- Female employees experience higher career opportunities stress (22%) than male employees (15%). This may be because there are more male than female employees in the organisation, which limits their career opportunities.
- Male employees experience very high stress related to remuneration and employee policies (43%), which is higher than the 36% experienced by the female counterparts. This outcome can be contributed to the fact that male employees are in most cases the bread-winners.

Table 16: Distribution of Stress and Causes of Stress by Age Bands

LEVEL	AGE BANDS CATEGORY	STRESS LEVELS	CAUSES OUTSIDE WORK SITUATION	CAUSES IN THE WORK SITUATION					
				ORGANISATIONAL FUNCTIONING	TASK CHARACTERISTIC	PHYSICAL WORKING CONDITIONS	CAREER OPPORTUNITIES	SOCIAL MATTERS	REMUNERATION AND EMPLOYEE POLICIES
NORMAL	0-30	85%	90%	61%	79%	72%	63%	74%	55%
	31-40	85%	92,5%	50%	60%	55%	62,5%	75%	32,5%
	41-50	82%	89%	41%	76%	65%	53%	76%	29%
	51-60	100%	100%	100%	100%	50%	75%	100%	50%
	61 higher	100%	100%	100%	100%	100%	100%	100%	100%
HIGH	0-30	10%	8%	23%	10%	10%	16%	15%	8%
	31-40	7,5%	7,5%	27,5%	20%	30%	25%	17,5%	17,5%
	41-50	18%	11%	35%	18%	12%	23%	18%	29%
	51-60	0%	0%	0%	0%	50%	15%	0%	25%
	61 higher	0%	0%	0%	0%	0%	0%	0%	0%
VERY HIGH	0-30	5%	2%	16%	11%	18%	21%	11%	37%
	31-40	7,5%	0%	22,5%	20%	15%	12,5%	7,5%	50%
	41-50	0%	0%	24%	6%	23%	24%	6%	42%
	51-60	0%	0%	0%	0%	0%	0%	0%	25%
	61 higher	0%	0%	0%	0%	0%	0%	0%	0%

The most prominent points from Table 16 are the following:

- 35% of employees in the age band 41-50 years, experience high levels of organisational functioning stress within the work environment and 24% of employees in the same age band experience very high organisational functioning stress. Combined it is higher than the 41% normal organisational functioning stress experienced by the same age band.

This may be due to the fact that employees in this age band are already working in the organisation for many years. These employees are experts in their field and may therefore not always agree with the functioning of the organisation. They also may not always be included in the decisions that are made in the organisation, especially those that directly influence them such as the type of operating system to use.

- 50% of employees in the age band 51-60 experience high levels of physical working conditions stress. This may be because some of them may have special needs which are not catered for by the organisation.
- 50% of employees in the age band 31-40 experience very high levels of remuneration and employee policies stress within the work environment and 17,5% employees in the same age band experience high levels of the same stress. 42% of employees in the age band 41-50 experience very high levels of remuneration and employee policies' stress, while a further 29% of employees in the same age band experience high levels of remuneration and employee policies` stress.

From these figures, it is the opinion of the researcher that remuneration substantially increases the stress levels of Air Traffic Controllers. This may be because employees in the age band 31-40 have young families to care for, house bonds, car loans and other debt to pay. Employees in the age band 41-50 may be thinking of retiring and therefore better benefits and pay will ensure a better life after retirement.

Table 17: Distribution of Stress and Causes of Stress by ATC Centres

17.1 DISTRIBUTION OF STRESS AND CAUSES OF STRESS AT BLOEMFONTEIN CENTRE								
LEVEL	STRESS LEVELS	CAUSES OUTSIDE WORK SITUATION	CAUSES IN THE WORK SITUATION					
			ORGANISATIONAL FUNCTIONING	TASK CHARACTERISTIC	PHYSICAL WORKING CONDITIONS	CAREER OPPORTUNITIES	SOCIAL MATTERS	REMUNERATION AND EMPLOYEE POLICIES
NORMAL	89%	100%	78%	67%	100%	78%	89%	56%
HIGH	11%	0%	22%	33%	0%	22%	11%	0%
VERY HIGH	0%	0%	0%	0%	0%	0%	0%	44%

17.2 DISTRIBUTION OF STRESS AND CAUSES OF STRESS AT PORT ELIZABETH CENTRE								
LEVEL	STRESS LEVELS	CAUSES OUTSIDE WORK SITUATION	CAUSES IN THE WORK SITUATION					
			ORGANISATIONAL FUNCTIONING	TASK CHARACTERISTIC	PHYSICAL WORKING CONDITIONS	CAREER OPPORTUNITIES	SOCIAL MATTERS	REMUNERATION AND EMPLOYEE POLICIES
NORMAL	93%	100%	93%	100%	79%	93%	93%	79%
HIGH	0%	0%	7%	0%	14%	7%	7%	7%
VERY HIGH	7%	0%	0%	0%	7%	0%	0%	14%

17.3 DISTRIBUTION OF STRESS AND CAUSES OF STRESS AT JOHANNESBURG CENTRE								
LEVEL	STRESS LEVELS	CAUSES OUTSIDE WORK SITUATION	CAUSES IN THE WORK SITUATION					
			ORGANISATIONAL FUNCTIONING	TASK CHARACTERISTIC	PHYSICAL WORKING CONDITIONS	CAREER OPPORTUNITIES	SOCIAL MATTERS	REMUNERATION AND EMPLOYEE POLICIES
NORMAL	73%	95%	35%	78%	43%	49%	68%	24%
HIGH	16%	5%	32,5%	8%	33%	30%	24%	22%
VERY HIGH	11%	0%	32,5%	14%	24%	21%	8%	54%

17.4 DISTRIBUTION OF STRESS AND CAUSES OF STRESS AT DURBAN CENTRE								
LEVEL	STRESS LEVELS	CAUSES OUTSIDE WORK SITUATION	CAUSES IN THE WORK SITUATION					
			ORGANISATIONAL FUNCTIONING	TASK CHARACTERISTIC	PHYSICAL WORKING CONDITIONS	CAREER OPPORTUNITIES	SOCIAL MATTERS	REMUNERATION AND EMPLOYEE POLICIES
NORMAL	100%	83%	67%	100%	83%	50%	83%	17%
HIGH	0%	17%	33%	0%	17%	50%	17%	50%
VERY HIGH	0%	0%	0%	0%	0%	0%	0%	33%

17.5 DISTRIBUTION OF STRESS AND CAUSES OF STRESS AT CAPE TOWN CENTRE								
LEVEL	STRESS LEVELS	CAUSES OUTSIDE WORK SITUATION	CAUSES IN THE WORK SITUATION					
			ORGANISATIONAL FUNCTIONING	TASK CHARACTERISTIC	PHYSICAL WORKING CONDITIONS	CAREER OPPORTUNITIES	SOCIAL MATTERS	REMUNERATION AND EMPLOYEE POLICIES
NORMAL	100%	91%	55%	82%	82%	64%	91%	55%
HIGH	0%	9%	27%	9%	0%	18%	0%	9%
VERY HIGH	0%	0%	18%	9%	18%	18%	9%	36%

17.6 DISTRIBUTION OF STRESS AND CAUSES OF STRESS AT EAST LONDON CENTRE								
LEVEL	STRESS LEVELS	CAUSES OUTSIDE WORK SITUATION	CAUSES IN THE WORK SITUATION					
			ORGANISATIONAL FUNCTIONING	TASK CHARACTERISTIC	PHYSICAL WORKING CONDITIONS	CAREER OPPORTUNITIES	SOCIAL MATTERS	REMUNERATION AND EMPLOYEE POLICIES
NORMAL	75%	100%	75%	100%	50%	75%	75%	50%
HIGH	25%	0%	0%	0%	50%	0%	0%	25%
VERY HIGH	0%	0%	25%	0%	0%	25%	25%	25%

17.7 DISTRIBUTION OF STRESS AND CAUSES OF STRESS AT LANSERIA CENTRE								
LEVEL	STRESS LEVELS	CAUSES OUTSIDE WORK SITUATION	CAUSES IN THE WORK SITUATION					
			ORGANISATIONAL FUNCTIONING	TASK CHARACTERISTIC	PHYSICAL WORKING CONDITIONS	CAREER OPPORTUNITIES	SOCIAL MATTERS	REMUNERATION AND EMPLOYEE POLICIES
NORMAL	100%	100%	57%	71%	43%	71%	71%	43%
HIGH	0%	0%	29%	0%	14%	14%	29%	14%
VERY HIGH	0%	0%	14%	29%	43%	15%	0%	43%

17.8 DISTRIBUTION OF STRESS AND CAUSES OF STRESS AT MAFIKENG CENTRE								
LEVEL	STRESS LEVELS	CAUSES OUTSIDE WORK SITUATION	CAUSES IN THE WORK SITUATION					
			ORGANISATIONAL FUNCTIONING	TASK CHARACTERISTIC	PHYSICAL WORKING CONDITIONS	CAREER OPPORTUNITIES	SOCIAL MATTERS	REMUNERATION AND EMPLOYEE POLICIES
NORMAL	100%	67%	67%	67%	67%	67%	67%	67%
HIGH	0%	33%	0%	33%	33%	0%	0%	0%
VERY HIGH	0%	0%	33%	0%	0%	33%	33%	33%

17.9 DISTRIBUTION OF STRESS AND CAUSES OF STRESS AT KIMBERLEY CENTRE								
LEVEL	STRESS LEVELS	CAUSES OUTSIDE WORK SITUATION	CAUSES IN THE WORK SITUATION					
			ORGANISATIONAL FUNCTIONING	TASK CHARACTERISTIC	PHYSICAL WORKING CONDITIONS	CAREER OPPORTUNITIES	SOCIAL MATTERS	REMUNERATION AND EMPLOYEE POLICIES
NORMAL	62,5%	50%	50%	100%	50%	50%	50%	37,5%
HIGH	12,5%	37,5%	12,5%	0%	12,5%	12,5%	25%	12,5%
VERY HIGH	25%	12,5%	37,5%	0%	37,5%	37,5%	25%	50%

17.10 DISTRIBUTION OF STRESS AND CAUSES OF STRESS AT VIRGINIA CENTRE								
LEVEL	STRESS LEVELS	CAUSES OUTSIDE WORK SITUATION	CAUSES IN THE WORK SITUATION					
			ORGANISATIONAL FUNCTIONING	TASK CHARACTERISTIC	PHYSICAL WORKING CONDITIONS	CAREER OPPORTUNITIES	SOCIAL MATTERS	REMUNERATION AND EMPLOYEE POLICIES
NORMAL	100%	86%	71%	71%	100%	71%	86%	57%
HIGH	0%	14%	29%	14%	0%	14%	14%	14%
VERY HIGH	0%	0%	0%	15%	0%	15%	0%	29%

17.11 DISTRIBUTION OF STRESS AND CAUSES OF STRESS AT POLOKWANE CENTRE								
LEVEL	STRESS LEVELS	CAUSES OUTSIDE WORK SITUATION	CAUSES IN THE WORK SITUATION					
			ORGANISATIONAL FUNCTIONING	TASK CHARACTERISTIC	PHYSICAL WORKING CONDITIONS	CAREER OPPORTUNITIES	SOCIAL MATTERS	REMUNERATION AND EMPLOYEE POLICIES
NORMAL	100%	100%	75%	75%	50%	75%	75%	50%
HIGH	0%	0%	0%	0%	25%	0%	0%	0%
VERY HIGH	0%	0%	25%	25%	25%	25%	25%	50%

17.12 DISTRIBUTION OF STRESS AND CAUSES OF STRESS AT GRAND CENTRAL CENTRE								
LEVEL	STRESS LEVELS	CAUSES OUTSIDE WORK SITUATION	CAUSES IN THE WORK SITUATION					
			ORGANISATIONAL FUNCTIONING	TASK CHARACTERISTIC	PHYSICAL WORKING CONDITIONS	CAREER OPPORTUNITIES	SOCIAL MATTERS	REMUNERATION AND EMPLOYEE POLICIES
NORMAL	60%	80%	20%	40%	60%	20%	40%	40%
HIGH	40%	20%	40%	40%	20%	20%	20%	20%
VERY HIGH	0%	0%	40%	20%	20%	60%	40%	40%

17.13 DISTRIBUTION OF STRESS AND CAUSES OF STRESS AT RAND AIRPORT CENTRE								
LEVEL	STRESS LEVELS	CAUSES OUTSIDE WORK SITUATION	CAUSES IN THE WORK SITUATION					
			ORGANISATIONAL FUNCTIONING	TASK CHARACTERISTIC	PHYSICAL WORKING CONDITIONS	CAREER OPPORTUNITIES	SOCIAL MATTERS	REMUNERATION AND EMPLOYEE POLICIES
NORMAL	100%	100%	60%	80%	80%	60%	80%	60%
HIGH	0%	0%	40%	20%	0%	20%	20%	0%
VERY HIGH	0%	0%	0%	0%	20%	20%	0%	40%

17.14 DISTRIBUTION OF STRESS AND CAUSES OF STRESS AT PIETERMARITZBURG CENTRE								
LEVEL	STRESS LEVELS	CAUSES OUTSIDE WORK SITUATION	CAUSES IN THE WORK SITUATION					
			ORGANISATIONAL FUNCTIONING	TASK CHARACTERISTIC	PHYSICAL WORKING CONDITIONS	CAREER OPPORTUNITIES	SOCIAL MATTERS	REMUNERATION AND EMPLOYEE POLICIES
NORMAL	100%	100%	50%	100%	100%	75%	100%	50%
HIGH	0%	0%	50%	0%	0%	25%	0%	0%
VERY HIGH	0%	0%	0%	0%	0%	0%	0%	50%

The most prominent points from Tables 17.1 to 17.14 are the following:

- 50% of employees working at Kimberley Centre followed by 33% of employees at Mafikeng Centre attribute causes outside the work situation as high and very high (combined) contributors to stress. This may be because both centres form part of

smaller communities and therefore they are more involved in the community and with other members. Their social lives may play a bigger and more important role.

- The level of organisational functioning stress (high and very high combined) among employees at Johannesburg Centre (32,5% and 32,5%) is much higher than the average. This may be due to the fact that Johannesburg Centre is the busiest centre in South Africa and the Air Traffic Controllers may feel that they do not receive recognition for the work they do. It may also be because they are so good at what they do, they may feel to be more involved in decision-making in their expert capacity, within the organisation.
- The employees of Grand Central Centre experience the highest level of organisational functioning stress than any other centre with 80% (40% high and 40% very high combined). This may be as a result of no open communication channels between the Air Traffic Controllers and their supervisors or Head Office management.
- Task characteristics are experienced as high and very high contributors (combined) to stress by 60% of employees at Grand Central Centre, followed by 33% of employees at both Bloemfontein and Mafikeng Centres.
- 57% (33% high and 24% very high combined) of employees at Johannesburg Centre as well as Lanseria Centre (14% high and 43% very high combined), experience high levels of physical working condition` stress. This is followed by 50% of employees working at East London Centre, Kimberley Centre (12,5% high and 37,5% very high), as well as Polokwane Centre (25% high and 25% very high), also experiencing high to very high levels of the same stress. This may be because the availability of job equipment as well as it being in proper working order, are not always assured.
- Career opportunities are experienced as high and very high (combined) contributors to stress inside the work environment, especially by Grand Central Centre

employees (80%), followed by Johannesburg Centre (51%) as well as both Durban and Kimberley Centres with 50% each.

This may be due to the fact that career opportunities and promotions are indeed limited as there are only a few management positions available in the organisation. Within the Air Traffic Control environment it is not always possible to promote employees as there are only a certain number of Air Traffic Control managerial positions at each centre. Not all individuals have the skills to work at big centres, such as Cape Town and Johannesburg, due to the huge traffic volume at these centres.

- Social matters inside the work situation are experienced as high and very high (combined) contributors to stress by 60% of employees at Grand Central Centre followed by 50% of employees at Kimberley Centre. It is the opinion of the researcher that because these are smaller centres, the Air Traffic Controllers do not perceive to have a high status in their job, as would be the case with Johannesburg employees.
- Remuneration and personnel policies are experienced as huge contributors to stress (high and very high combined) inside the work environment by 83% of employees at Durban Centre followed by 76% at Johannesburg Centre, 62,5% at Kimberley Centre, 60% at Grand Central Centre, 57% at Lanseria Centre, 50% at East London Centre, 50% at Polokwane Centre, and 50% at Pietermaritzburg Centre.

This could be attributed to the fact that Air Traffic Controllers have very scarce skills, knowing that they provide a very essential service and that there is a world-wide shortage of Air Traffic Controllers. Therefore, they feel that they need to be paid in line with other Air Traffic Controllers world-wide who perform the same duties and get better remuneration and benefits, such as the UAE.

Table 18: Distribution of Stress and Causes of Stress by Post Level

LEVEL	POST LEVEL	STRESS LEVELS	CAUSES OUTSIDE WORK SITUATION	CAUSES IN THE WORK SITUATION					
				ORGANISATIONAL FUNCTIONING	TASK CHARACTERISTIC	PHYSICAL WORKING CONDITIONS	CAREER OPPORTUNITIES	SOCIAL MATTERS	REMUNERATION AND EMPLOYEE POLICIES
NORMAL	ATCO1	85%	85%	65%	77,5%	77,5%	67,5%	75%	57,5%
	ATCO2	94%	87,5%	56%	87,5%	69%	62,5%	75%	50%
	ATCO3	84%	96%	51%	82%	57%	59%	76%	35%
HIGH	ATCO1	10%	12,5%	22,5%	15%	10%	12,5%	15%	2,5%
	ATCO2	0%	12,5%	13%	0%	6%	12,5%	12,5%	19%
	ATCO3	10%	4%	29%	9%	25%	26%	16%	21%
VERY HIGH	ATCO1	5%	2,5%	12,5%	7,5%	12,5%	20%	10%	40%
	ATCO2	6%	0%	31%	12,5%	25%	25%	12,5%	31%
	ATCO3	6%	0%	20%	9%	18%	15%	8%	44%

The most prominent points from Table 18 are the following:

- Organisational functioning is attributed as a high and very high cause of stress in the work situation by both ATCO 3 (49%) and ATCO 2 (44%). This may be due to the fact that ATCO 3 and ATCO 2 have been employed longer in the organisation and want to be part of decision-making.
- 43% of ATCO 3 attribute physical working conditions as a high and very high cause of stress in the work environment.
- 41% of ATCO 3 experience career opportunities as a high and very high cause of stress in the work environment. ATCO 3 have already established themselves as Air Traffic Controllers in the organisation and are thus experiencing career opportunities

and promotion into management as a contributor to stress in the opinion of the researcher.

- 65% of ATCO 3 followed by 50% of ATCO 2 and 42,5% of ATCO 1 experience remuneration and employee policies as a combined high and very high cause of stress in the working environment. Remuneration levels and expectations increase when Air Traffic Controllers' skills increase in the opinion of the researcher.

Table 19: Distribution of Stress and Causes of Stress by Educational Category

LEVEL	EDUCATIONAL CATEGORY	STRESS LEVELS	CAUSES OUTSIDE WORK SITUATION	CAUSES IN THE WORK SITUATION					
				ORGANISATIONAL FUNCTIONING	TASK CHARACTERISTIC	PHYSICAL WORKING CONDITIONS	CAREER OPPORTUNITIES	SOCIAL MATTERS	REMUNERATION AND EMPLOYEE POLICIES
NORMAL	GRADE 12	81%	90%	59%	86%	60%	59%	77%	44%
	GRADUATE	88%	94%	50%	72%	72%	62%	75%	37%
	POST GRADUATE	95%	91%	59%	82%	72%	77%	73%	55%
HIGH	GRADE 12	10%	9%	21%	8%	23%	23%	14%	16%
	GRADUATE	9%	6%	28%	9%	9%	19%	16%	16%
	POST GRADUATE	5%	9%	32%	14%	14%	9%	18%	9%
VERY HIGH	GRADE 12	9%	1%	20%	6%	17%	18%	9%	40%
	GRADUATE	3%	0%	22%	19%	19%	19%	9%	47%
	POST GRADUATE	0%	0%	9%	4%	14%	14%	9%	36%

The most prominent points from Table 19 are the following:

- 50% of employees who are graduated followed by 41% of employees with a Grade 12 qualification as well as 41% of employees with a post-graduate qualification, experience organisational functioning as high and very high causes of stress in the working environment. Graduates feel that they have more to contribute to the

organisation and are therefore more sceptical about the way in which the organisation is managed.

- 63% of employees who are graduated followed by 56% of employees with grade 12 qualification and 45% of employees with a post-graduate, attribute remuneration and employee policies as a contributor to high and very high cause of stress in the work environment.

Table 20: Distribution of Stress and Causes of Stress by Marital Status

LEVEL	MARITAL STATUS CATEGORY	STRESS LEVELS	CAUSES OUTSIDE WORK SITUATION	CAUSES IN THE WORK SITUATION					
				ORGANISATIONAL FUNCTIONING	TASK CHARACTERISTIC	PHYSICAL WORKING CONDITIONS	CAREER OPPORTUNITIES	SOCIAL MATTERS	REMUNERATION AND EMPLOYEE POLICIES
NORMAL	MARRIED	93%	93%	51%	87%	58%	53%	80%	36%
	UNMARRIED	80%	90%	61%	77%	71%	64%	72%	51%
HIGH	MARRIED	5%	7%	29%	6%	24%	29%	11%	20%
	UNMARRIED	12%	9%	22%	13%	13%	19%	19%	10%
VERY HIGH	MARRIED	2%	0%	20%	7%	18%	18%	9%	44%
	UNMARRIED	8%	1%	17%	10%	16%	17%	9%	39%

The most prominent points from Table 20 are the following:

- 49% of married employees and 39% of unmarried employees attribute organisational functioning as a high and very high contributor to stress. It is the opinion of the researcher that married employees could be more critical of organisational functioning as such issues are also bench-marked and reflected upon at home.
- 42% of married employees experience physical working conditions as a high and very high cause of stress in the work environment It is once again in the opinion of the researcher that married employees could be more critical of the physical working conditions as such issues are also bench-marked and reflected upon at home.

- 47% of married employees experience career opportunities as a high and very high cause of stress. This may be because promotions will lead to better remuneration which will assist in caring for dependants.
- 64% of married employees and 49% of unmarried employees attribute remuneration and employee policies as a contributor to high and very high stress. This may be due to the fact that higher remuneration and better employee benefits will assist in the caring for dependants.

CHAPTER 7 – CONCLUSION AND RECOMMENDATIONS

7.1 INTRODUCTION

It is evident from the results of the research undertaken that stress is prevalent and a very real occurrence in the organisation for Air Traffic Controllers. Factual situations can now effectively be dealt with by management by focussing on the current situation and have an outcomes based approach, which can be facilitated through structured Change Management programmes. It is proposed that interventions focus on the following areas of concern:

- Causes of stress outside the work situation need to be addressed with employees working at Kimberley and Mafikeng Centres.

Due to the fact that there are so many issues outside the work environment that can cause stress such as financial circumstances and family problems, it is recommended that independent professionals/specialists are used to assist employees in giving guidance, by means of Employee Wellness Programs.

- Organisational functioning as a cause of stress with employees in the age band 41-50 years as well as employees at Grand Central Centre and Johannesburg Centre are to be addressed.

It is recommended that Management and Top Management must start engaging Air Traffic Controllers in decision-making within the organisation as they are experts in their field and can contribute immensely to the organisation. Recognition must also be given to these employees for the work that they do, as it must be recognised that their work are very specialised.

- The physical working conditions as a stressor for employees within the age band 51-60 as well as employees working at Johannesburg, Lanseria, East London,

Kimberley and Polokwane Centres must be investigated and changed to enhance work performance.

It is recommended that a professional with the necessary expertise on ergonomics be contacted and consulted on this important issue. Technicians must also ensure that all job equipment be in proper working order.

- Uncertainties regarding career opportunities for female employees, married employees and employees working at Grand Central, Johannesburg, Durban and Kimberley Centres need to be addressed and clarified.
- It is recommended that one-on-one meetings must take place between all Air Traffic Controllers and their various pool managers and Human Resources. This will allow for all to be in the clear on their respective career paths and what management expects of them. Management will also be informed of what each Air Traffic Controller aspire to become and where they want to work. All the station (centre) managers and operational managers must be actively involved in this process.
- Remuneration, employee benefits and employee policies seem to be the biggest cause of stress for Air Traffic Controllers across the whole spectrum of what was researched. Seeing as it is such a huge stressor, this important factor must be taken into account and addressed.

It is recommended that it must be recognised by Management and Top Management that Air Traffic Controllers have a very scarce skill and that they provide an indispensable service. The principle of supply and demand must apply, as there is a worldwide shortage of Air Traffic Controllers. Therefore, their remuneration, employee benefits and employee policies should reflect that by increasing it, so that they are paid inline with other Air Traffic Controllers world-wide. This will also decrease labour turnover and ensure a loyal work force and it might even attract Air Traffic Controllers from other countries to come and work in South Africa.

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