AN EVALUATION OF THE RESILIENCY OF AERODROME RESCUE FIREFIGHTERS AT KING SHAKA INTERNATIONAL AIRPORT

By

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DEDICATION

This work is dedicated to my parents, whose lifelong moral support and encouragement provided the inspiration to complete my studies.

ACKNOWLEDGEMENTS

I wish to thank the Almighty God for giving me the ability and perseverance to complete this study, and for the healing of the fractured leg sustained during the course of this study.

I also wish to take this opportunity to express my sincere thanks and appreciation to the following people and organisations for their valuable contributions towards making this study a success.

- My wife, Elena, sons Geraldo and Stanley and daughter Elrisa for your love, trust and support.
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- My manager, Ms Bongiwe Pityi, for the positive influence she had on me during my studies.

INTRODUCTORY MESSAGE

All of us are ordinary people. However, every one of us has extraordinary possibilities and strengths. Everyone stumbles and falls from time to time, but each of us has the capability to get up and carry on. We call this ability to get up and get going resilience.

(Wagnild 2009: 10)

Declaration by Linguist

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To whom it concerns

I, G J KUNZ, hereby declare that I had been appointed by candidate, M. Nefdt, to attend to the linguistic aspects of the dissertation hereby submitted.

To my knowledge all suggestions and recommendations have been attended to. However, I cannot be held responsible for errors incurred either by accident or on purpose, after the final submission.

Thank you for your business!

♦Document design ♦ Editing ♦ Hons, Masters, Doctoral dissertations ♦ Books ♦ Business correspondence ♦ Reports ♦ Annual Report ♦ Business proposal ♦ CV or Resume ♦ Translation: Afrikaans<>English

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- Aviation
- Ecological
- Firefighter
- Protective factor
- Resilience
- Risk
- Strength
- Strengths perspective

ABBREVIATIONS / ACRONYMS

ACSA	Airports Company of South Africa
AEMS	Aerodrome Emergency Management System
ARFF	Aerodrome Rescue Firefighter
ARFFS	Aerodrome Rescue Fire Fighting Service
CAA	Civil Aviation Authority
CAR	Civil Aviation Regulation
EMRS	Emergency Medical Rescue Services
ERP	Emergency Response Preparedness
ICAO	International Civil Aviation Organisation
KSIA	King Shaka International Airport
PTSD	Post Traumatic Stress Disorder
SACAA	South African Civil Aviation Authority

ABSTRACT

Although significant strides have been made in improving the safety of commercial air transport, fatal aircraft accidents are, and will continue to be an inevitable facet of the air transport industry. Consequently, the role that Aerodrome Rescue Fire Fighting (ARFF) personnel play in protecting the lives of passengers and crew is a vital one. It is therefore imperative that the emotional preparedness of these first responders should not be neglected.

Fire fighting is confirmed as one of the most dangerous and stressful occupations. Aerodrome rescue fighting adds an additional risk factor to this profession as no other transportation accident has the potential for intense fires; multiple deaths of hundreds of passengers; grotesque burn injuries; multiple fractures; mutilations; human suffering and environmental damage like aviation disasters. As subject experts these airport firefighters are the first responders when commercial aircraft is involved in aircraft accidents on or off airport, and it is therefore necessary to protect them prior, during and after exposure to potentially traumatic events. Supporting them will reduce the potential for loss of man hours due to incapacity, it will increase turnover, and will demonstrate appreciation for these valuable professionals.

This mini dissertation assesses the issues described above. Areas such as the legislative regulated environment in which Aerodrome Rescue Fire Fighting Services (ARFFS) exist, are explored. From a strengths perspective, within an ecological system comprising the individual (Micro-level); the family (Meso-level) and the working environment (Exo-level), the protective factors that will buffer firefighters against the mental and psychological effects of exposure to potentially traumatic events, thus enhancing their resilience, is explored and described. The same is done with the risk factors that will impact on their vulnerability.

Information was gathered using a diversity of sources namely scientific journals, studies, accident databases, personal observation and a variety of regulations. In view of the information gathered, the mini dissertation addresses the subject of the resilience of airport firefighters at King Shaka International Airport.

In line with the research questions, this study established that the firefighters at King Shaka International Airport have several protective factors at their disposal that would buffer them against the negative effects of traumatic exposure. These protective factors are located within themselves, their families and at their place of work and include social support, training received, mental and physical preparedness for aviation disasters and competencies and skills. It is therefore predicted that the first aviation disaster to occur at this airport or in its immediate vicinity will not compromise the airport operating licence due to insufficient firefighters remaining fit for duty, irrespective of the severity of the exposure. This study finally presents recommendations detailing actions to be taken by the employer, which could potentially result in building and enhancing the resiliency of aerodrome rescue firefighters.

DECLARATION OF ORIGINALITY

I, Mervyn Keith Nefdt, hereby present for consideration by the Disaster Risk Management Training and Education Centre for Africa (DIMTEC), within the Department of Agricultural Economics, Faculty of Natural and Agricultural Sciences at the University of the Free State (UFS), my mini dissertation in partial fulfilment of the requirements for the degree of Master's in Disaster Management.

I sincerely declare that this mini dissertation is the product of my own efforts. No other person has published a similar study from which I might have copied, and at no stage will this work be published without my consent, as well as that of the Disaster Risk Management Training and Education Centre for Africa (DIMTEC).

Views, opinions and proposals expressed herein should be attributed to the author, neither to the Disaster Risk Management Training and Education Centre for Africa, nor to any of the sponsors who were acknowledged.

NAME AND SURNAME: ----------

SIGNATURE:----------

CHAPTER 1

METHODOLOGICAL ORIENTATION

1.1 INTRODUCTION

The events of 11 September 2001, in which commercial aircrafts crashed into the Twin Towers of the World Trade Centre in New York City, U.S.A, highlighted the importance of understanding the effects of trauma and disaster on the resiliency of rescue and disaster workers. These first responders to a traumatic event are exposed to life-threatening situations, working with survivors and families, recovering the dead and injured. Fullerton, Ursano and Wang (2004: 1370) state that firefighters, by nature of the work, have high levels of post-traumatic stress disorder. This assertion is supported by Slottje *et al.* (2007:240) who confirm that the firefighters, who responded to an aircraft disaster in Amsterdam in 1992, rescued people, extinguished fires, identified and recovered or searched for victims and human remains, cleaned up the disaster area and supported the injured victims.

However, research findings reveal that only 22% of the emergency responders at the World Trade Centre had acute post-traumatic stress symptoms (Perrin *et al.* 2007:1385) whilst Suvak *et al.* (2008: 30) assert that for some individuals that attack had a positive outcome as it had an enduring impact on their well-being and functioning. The fact that the majority of the emergency responders did not suffer from post-traumatic stress may be ascribed to, amongst others, their resiliency (North, *et al.* 2002: 171). In line with this assertion Litz (2002: 266) asserts that most people exposed to trauma adapt well on their own or with the help of naturally occurring supports after initial period of distress and acute post-traumatic symptoms. In agreement, Blundo and Greene (2007: 164) refer to findings that the human species is amazingly resilient, and people are able to recover from trauma and go on to do amazing things with their lives. One of the most impressive qualities of the human being is its ability to withstand serious setbacks and severe crises.

Since the 1970s there has been an increasing interest in the concept of "resilience". Researchers like Garmecy and Rutter (1983: 12), Werner and Smith (1992: 55), Smith and Carlson (1997: 231), Minnard (2001: 233) and Blaum, McNeely and Nonnemaker (2002: 29) used resilience as research topic. Starting with children, progressing to adolescents and finally culminating with adults they attempted to determine which factors enabled some individuals, who despite exposure to adverse circumstances, have the capacity to "bounce back" from trauma, possibly even being strengthened by their negative experiences, whilst others become victims of their circumstances.

Resiliency research is contributing to a deviation from a pathology-based model where problems, needs and deficiencies are highlighted (Lubbe & Eloff 2003: 80). Wolin and Wolin (1993: 13) further state that in psychology and psychiatry, there is "comfort in identifying, categorising and labelling diseases". In deviation to this Macdonald (1997: 115) and Kriek and Eloff (2003:39) focus on human strengths and assets of the individual and the resources in their environment that can be mobilised to help with their problems and thus empower them to help themselves, as opposed to focusing exclusively on their problems and needs.

Aviation disasters, which airport firefighters might be exposed to, are associated with mass fatalities, grotesque burn injuries, multiple fractures, mutilations and suffering, as witnessed on television when commercial aircraft crashed into the Twin Towers of the World Trade Centre in New York City, U.S.A on 9/11. A total of 411 emergency workers, of whom 341 were firefighters who responded, died as they attempted to implement rescue and fire suppression efforts.

Friedrickson *et al*. (2003:365) confirm that in addition to the extraordinary financial devastation and loss of human lives, the 9/11 terrorist attacks generated considerable emotional turmoil. Studies point to the fact that six years after 9/11, firefighters at the World Trade Centre disaster, continue to experience substantial psychological distress (Perrin *et al.* 2007:1385). However, as described earlier, the firefighters who suffered from post-traumatic stress were significantly fewer than those that did not, due to the fact that they were more resilient (Perrin *et al.* 2007:1385). Using an earlier example, North *et al*. (2002: 171) point us to the fact that the firefighters who responded to the Oklahoma City bombing were exposed to mass fatalities and suffering and were expected to "exhibit unparalleled psychological responses to this extreme

event". However, post traumatic stress disorder (PTSD) was diagnosed in only 13% of these firefighters. They then refer to several studies that reported general resiliency and well-being among rescue workers following disasters.

Although significant strides have been made in improving the safety of commercial air transport, aviation disasters are and will continue to be an inevitable facet of the air transport industry (Abeyratne 1998: 25; Button *et al.* 2004: 251-252; Janic, 2000: 43; McFadden &Towell, 1999: 177). Consequently Airport Rescue and Firefighting (ARFF) personnel play a vital role in protecting the lives of passengers and crew. It is therefore imperative that airport firefighters are psychologically prepared for response to aviation disasters.

As mentioned by Raphael and Newman (2000:115), firefighting is a stressful occupation and with reference to their functions they perform rescue, recovery and clean-up operations after disasters. In addition they are exposed to long hours of work often under difficult conditions, are often exposed to mass death or gruesome scenes, and endure frightening or unpleasant surroundings. However, working in stressful environments does not automatically lead to negative psychological outcomes, as studies find that training, experience and prior exposure to stressful events are associated with better outcome after a disaster (Raphael & Newman 2000: 115).

With specific reference to firefighters, the same authors suggest that the resilience in firefighters may be related to their career selection, their preparedness, experiences and post disaster mental interventions. Internal electronic statistics show that the airport firefighters at King Shaka International Airport, although classified as emergency personnel, had never been exposed to a commercial aircraft disaster, and thus were never exposed to mass death or gruesome scenes. From this it can be deduced that these airport firefighters have no experience in handling aviation disasters that could have contributed to their preparedness.

From the above-mentioned findings it can be concluded that firefighters, although exposed to risk, have innate protection against these risk factors. In line with the above assertion, this chapter presents the strategy for carrying out the study in order to evaluate the resiliency of airport firefighters at King Shaka International Airport. It does so by presenting a detailed

methodological orientation. This is done logically and begins by introducing the topic for the study, outlining the research problem and research questions, presenting the aim of the study, outlining the research methods and procedures, demarcating the study, defining terms used in the study and presenting an outline of the research report.

The resiliency theory, which can be viewed as the opposite of vulnerability as used by Wisner *et al.* (1994:50) in the Pressure and Release model (PAR), and used as theoretical framework was chosen to facilitate the reader's understanding of the various components of the study. It will help to clarify the framework adopted in carrying out the project, the tools and resources employed, as well as key participants who contributed to the achievement of the objectives of the study.

Upon reading this chapter, the reader will be in a position to give an account of the strategy employed and the framework followed, as well as its anticipated significance in contributing to the body of knowledge of the resiliency of airport firefighters at King Shaka International Airport. The findings and recommendations of the study can be extrapolated and adapted to other airports in similar circumstances.

1.2 CHOICE OF TOPIC

The choice of this topic was influenced by the fact that worldwide, air transportation of passengers is growing, with annual increases exceeding 5% forecast up to 2030 (Boeing, 2011). The relevance of this fact is expressed by Janic (2000: 44) who states that historically a growth in air transport has been accompanied by an increase in aircraft accidents, thus an increase in potential for traumatic exposure for firefighters.

In addition, the aviation industry in South Africa, as well as internationally, is dependent on the availability of airport firefighters during operational hours of a licensed airport as fire and rescue services are referred to as one of the licence carrying functions of an airport. According to Chapter 9.2 of annexure 14, the Convention on International Civil Aviation, the principal objective of a rescue and firefighting service is to save lives. For this reason, the provision of means of dealing with an aviation disaster occurring at, or in the immediate vicinity of an

aerodrome assumes primary importance because it is within this area that there are the greatest opportunities of saving lives.

The most important factors, bearing on effective rescue in a survivable aviation disaster, are the training received, the effectiveness of the equipment and the speed with which personnel and equipment designated for rescue and firefighting purposes can be put to use. During flight operations sufficiently trained firefighters should be on duty and readily available to man the rescue and firefighting vehicles, and to operate the equipment at maximum capacity. Should airport firefighters, after exposure to the effects of an aviation disaster, be found unfit to resume their duties as a result of physical and mental problems, the airport might have to be closed if the minimum number of airport firefighters is not available. Owing to the uniqueness of aerodrome firefighting, municipal firefighters cannot stand in as units because of lack of aviation firefighter training and not being familiar with airport firefighting equipment.

A number of research studies have been conducted on firefighters, mainly after 9/11, but no studies of firefighter strengths enhancing their resilience, could be found. Because of this gap in the literature, an evaluation of the resilience, from a strengths perspective, of airport firefighters has been conducted. The researcher has been employed as the Chief Fire Officer at King Shaka International Airport since 2005. An own observation from practice in over 26 years of fire and rescue experience in professional fire and rescue services, is that the majority of firefighters, after exposure to potentially traumatic events, do not display signs and symptoms commensurate with that associated with post-traumatic stress disorder or other mental disorders. This phenomenon influenced the choice of topic and the theoretical framework chosen for this study, as indicated below,

The theoretical framework which will be used in order to explore, describe and explain the factors affecting the risk and resiliency of airport firefighters, will be the resiliency theory in conjunction with ecological thinking. Greene and Livingston (2001:63), hold the view that resilience is an ecological phenomenon, which refers to a network of influences such as family, peer group, school, neighbourhood and society that may affect individual resilience. In support of this assertion Greene and Livingstone (2001: 17) warn that human behaviour is not

considered the outcome of a single event, but the result of multiple, complex interaction between individuals and their environment over time.

In line with this assertion, Newman (2005: 227) also suggests that there is no one characteristic or trait identified as resilience. Rather there are many behaviours and actions associated with resilience. Maintaining good relationships, having an optimistic view of the world, keeping things in perspective, setting goals and taking steps to reach them, and being self confident are all associated with resilience. Later research (Masten 2010: 213) sees resilience as a process and affirms that resilience arises from many processes and interactions that extend beyond the boundaries of the individual, including close relationships and social support. It is, however, often mistakenly assumed to be a trait of an individual. In practice it is observed that firefighters although functioning as individuals, do so within a family system comprising of the family at home and family at work. They have access to protective factors from all three spheres of individual, family and place of work.

1.3 RESEARCH PROBLEM AND RESEARCH QUESTIONS

Studies of organisational stress to date have been predominantly embedded within a pathogenic framework, which focuses on what is inherently wrong with the world whilst focusing on the different manifestations of negative consequences for individuals (Burke & Paton 2006:2). The same authors further find that in the context of protective services, the pathogenic paradigm argues that exposure to any traumatic event will disrupt the capacity of all personnel involved to function normally. In an earlier study Paton *et al.* (2003: 34) found that the pathogenic paradigm predisposed organisations to assume that there was a direct link between exposure to adverse traumatic events and the automatic development of traumatic psychopathology.

Both these views must be rejected because in practice it is observed that the majority of firefighters remain fit for duty, irrespective of the severity of the traumatic exposure. This statement is supported by Joseph and Linley (2008: 3) who acknowledge that exposure to stressful and traumatic events can have severe and chronic psychological consequences.

However, they also assert that positive psychological changes can result from exposure to traumatic experiences.

Varvel *et al.* (2007: 458) suggest that relative to other occupations, work-related stressors may be particularly detrimental to firefighters. The same authors confirm that firefighters undergo a lengthy period of training, which continues throughout their careers. From this it can be concluded that a well trained firefighter represents a considerable investment in human resources. This investment is lost when stress leads to turnover, which can result when post-traumatic stress is not adequately addressed, and will result in post-traumatic stress disorder (Varvel *et al*. 2007: 458).

The staff compliment of firefighters at King Shaka International Airport consists of 64 firefighters including four heads of department (HODs). Corporate internal incident and accident records reveal that up to date no aviation disasters have ever occurred at this airport since opening as Louis Botha Airport in 1955, as well as at any Airports Company South Africa (ACSA) owned/operated airport in South Africa. From these statistics, it can be concluded that the airport firefighters at King Shaka International Airport has never been exposed to mass fatalities associated with aviation disasters.

If a commercial aircraft should crash at this airport, it would be a first-time exposure to mass fatalities, mutilation, grotesque burn and other injuries and suffering. This study is necessary to formulate conclusions regarding the resiliency of airport firefighters at King Shaka International Airport by focusing on their strengths. The findings and potential recommendations of this study might also be useful in 2010 when an increase in aircraft movements is expected due to the Soccer World Cup to be staged in South Africa. In addition, the new Airbus 380, with a passenger load of 550 passengers, will become the most challenging passenger-carrying aircraft when it commences flights to and from South Africa.

A successful trial flight of the Airbus 380 had already been conducted at the O.R Tambo International Airport in 2008. King Shaka International Airport has a runway length of 3.7 kilometres and has been classified as a diversion airport for O.R Tambo International, which means, whenever the Airbus 380 or any other aircraft cannot land at O.R. Tambo International

Airport due to adverse weather or any other reason, it will divert and land at King Shaka International Airport. The firefighters at KSIA must thus be ready and prepared to accept this aircraft. The new Airbus 380 carries 33% more passengers than the 747-400, which is currently the largest commercial aircraft landing at King Shaka International Airport.

As a result of no fatal aviation disasters occurring at King Shaka International Airport since opening, the airport firefighters have no experience in dealing with mass fatalities, grotesque burn injuries, multiple fractures, mutilations and suffering. Thus it cannot be predicted how they will be affected by the above-mentioned consequences of commercial aviation disasters if one should occur at this airport.

The point of departure of this study is that the airport firefighters at King Shaka International Airport do not have any exposure to aviation disasters, as aviation accidents rarely occur. It is not possible to predict if they are adequately psychologically prepared to effectively deal with an aviation disaster. This study evaluates resiliency of firefighters before a potentially traumatic event has occurred, which differs from previous studies in which resilience was researched after exposure to the traumatic event.

1.3.1 Problem statement

The research problem that directs this study is to perform an evaluation of the risk and protective factors that influence the resiliency of airport firefighters at King Shaka International Airport, and the implications thereof for their disaster preparedness. To clarify the research problem, the following research questions are addressed:

1.3.2 Research questions

- What are the protective factors which contribute to airport firefighters' resiliency in the workplace?
- What are the risk factors of the individual, family and place of work which give rise to challenges for airport firefighters' resiliency at work?
- Which actions by the employer could potentially result in building and enhancing the resiliency of airport firefighters in the workplace?

1.4 AIM OF THE STUDY

The study seeks to evaluate the risk and protective factors that influence the resiliency of airport firefighters at King Shaka International Airport. The study will be carried out within a resiliency theoretical framework. The aim, goals and objectives that guide this study are indicated as follows:

1.4.1 Aim

The aim of the study is to engage in an exploratory and descriptive investigation of the protective and risk factors of airport firefighters to the impact of exposure to mass fatalities, mutilation, grotesque burn and other injuries and suffering, so that guidelines for the formulation of scientifically founded, pro-active programmes may be formulated to enhance strengths, and build resiliency by ensuring preparedness of airport firefighters.

1.4.2 Goals

In an effort to achieve the above-mentioned aim, the following primary and secondary goals of the study are distinguished:

1.4.1 Primary goals

- To explore and describe the protective factors for the airport firefighter which contribute to their resiliency in the workplace.
- To determine and describe the risk factors for the airport firefighter which give rise to challenges for their resiliency in the workplace.
- To determine and describe which actions by the employer could potentially result in building and enhancing resiliency of the airport firefighter.

1.4.2 Secondary goals

- The results of the research, as well as the guidelines that emanate from the research, will be made available to the Airports Company of South Africa so that existing policies may be assessed and modified.

- To build the body of knowledge of the resiliency of airport firefighters, who in the disaster response phase, will be the first responders to aviation disasters at the airport.

1.4.3 OBJECTIVES

The objectives are distinguished for the literature and empirical investigation, and they are outlined as follows:

- **Literature study**
  - To formulate a useful outline of the concept of resiliency, from a strength perspective.
  - To establish a theoretical base for the study of resiliency, from a strength perspective.

- **Empirical investigation**

  This will be done to investigate and explore the factors that impact on the resiliency of airport firefighters. The process is broken down into the following steps.

  - ✓ Administering a questionnaire consisting of two standardised scales and a self structured biographical questionnaire combined into one questionnaire based on the literature study. The questionnaire will be administered to 60 firefighters at King Shaka International Airport (98.4% population) by the researcher on at least four days.
  - ✓ Engaging a pilot study to test the questionnaire content for validity and reliability.
  - ✓ Adjusting, if necessary, the questionnaire on the basis of the pilot study.
  - ✓ Implementing the questionnaire.
  - ✓ Comparing, interpreting and presenting the collected data in terms of descriptive statistics.
  - ✓ Finalising the research report.

1.5 RESEARCH METHODS, PROCEDURE AND ETHICAL CONSIDERATIONS

A literature study, supplemented by an empirical evaluation is conducted to answer the research questions.

1.5.1 METHODOLOGY

- **Phase 1: Literature study**

  - The protective and risk factors within the family are evaluated.
  - The protective and risk factors at the place of work are evaluated.

- **Phase 2: Empirical study**

  An empirical study is conducted to answer the research questions, and the empirical investigation is based on the findings in the literature study. For purposes of the empirical study, questionnaires are used.

1.5.2 BIOGRAPHICAL CHARACTERISTICS OF SAMPLE

The unit of analysis, as depicted in the problem statement on page eight in Section 1.2.1 of this chapter, refers to the investigation of the risk and protective factors affecting the resiliency of the airport firefighters at King Shaka International Airport. The individuals that will participate in the research will be airport firefighters at King Shaka International Airport. The available sample will consist of single, married and divorced males and females from different populations, language, religion, age groups, different length of firefighting experience and service. The following ranks of firefighters will be distinguished: Grade 1, Grade 2, Grade 3 firefighters, shift controllers and heads of department.

1.5.3 ETHICAL CONSIDERATIONS

Data should never be obtained at the expense of human beings (Williams *et al.* 1995: 30). Furthermore De Vos *et al.* (2005: 58) view harm to respondents, informed consent, deception, violation of privacy and debriefing of respondents as ethical issues that should be considered

during research. Furthermore De Vos *et al.* (2005:4) define ethics as a set of widely accepted moral principles that offer rules for, and behavioural expectations of the most correct conduct towards respondents and employers. The following ethical issues are considered for this study:

- **Avoidance of harm**

As stated by Dane (1990: 44) an ethical obligation rests on the researcher to protect participants from harm. De Vos *et al.* (2005: 58) clarify harm by asserting that participants can be harmed physically and/or emotionally. In compliance with this requirement, the researcher commits himself to change the nature of his research rather than expose his participants to any possibility of physical and/or emotional harm of which he may be aware of.

- **Informed consent**

The importance of obtaining informed consent is emphasised by Hakim (2000: 143). De Vos *et al.* (2005: 59) warn that obtaining implied consent implies that the goal of the investigation, the procedures to be followed, advantages, disadvantages and dangers to which respondents may be exposed must be rendered to potential participants. By completing and returning the questionnaire, it would be considered that participants signified their consent to have their responses used in this study.

- **Deception of respondents**

Deliberately misrepresenting facts in order to make another person believe what is not true is considered deception (Hornsby 2005: 378) and supports Judd *et al.* (1991: 496-497) who list three reasons why participants may be deceived, namely:

(1) To hide the real goal of the study
(2) To hide the real function of the actions of the participants
(3) To hide the experiences that subjects will go through.

The researcher commits himself to ensure that no form of deception will be inflicted on participants. If this happens inadvertently, it will be immediately rectified.

- **Violation of privacy**

The state of being alone and not watched or disturbed by other people is defined as privacy (Hornby 2005: 1155). The confidentiality of information supplied and privacy of the participants will be respected.

- **Debriefing of respondents**

In compliance with ethical requirements, all participants will be debriefed collectively after the study due to the confidentiality of the questionnaire, which cannot be traced to individual participants. During these debriefing sessions all misconceptions that may have arisen in the minds of the participants will be rectified.

1.6 DEMARCATION OF THE INVESTIGATION

The demarcation of the literature study includes literature from Social Work, Psychology, Sociology, Nursing, Psychiatry, Aviation and Disaster Management. Both local and international literature will be used including books, scientific journals, and legislation and policy documents. The resiliency theory is used as theoretical framework for the study. The concept of resiliency was traditionally applied to individuals, expanded families and communities. This study applies this concept to a group of airport firefighters at King Shaka International Airport.

The study is restricted demographically to the 64 firefighters at King Shaka International Airport, situated in Durban, KwaZulu Natal, South Africa.

1.7 DEFINITIONS USED IN STUDY

To ensure that uniform interpretations are linked to concepts that are utilised in the report, the following concepts require closer definition.

- **Aerodrome**

The International Civil Aviation Organisation (Annex 14: 1.1) defines an aerodrome as a defined area on land or water (including any buildings, installations and equipment) intended

to be used either wholly or in part for the arrival, departure and surface movement of aircraft. This definition is accepted for the purposes of this study and is used as such in the context of this report.

- **Aviation disaster**

The Disaster Management Act (South Africa 2002) defines disaster as a progressive or sudden, widespread or localised, natural or human-caused occurrence which:

(a) Causes or threatens to cause:
    I. Death, injury or disease
    II. Damage to property, infrastructure or the environment
    III. Disruption of the life of a community

(b) Is of a magnitude that exceeds the ability of those affected by the disaster to cope with its effects, using their own resources.

A simplified definition of this term is provided by Raphael and Newman (2000: 5) who define 'disaster' as a great misfortune causing widespread damage and suffering. In the context of this study the term aviation disaster is therefore used to refer to an occurrence in which a commercial airliner crashes on or off an airport resulting in mass (minimum of 20) fatalities (deaths), grotesque burn injuries, multiple fractures, mutilations and suffering. It is of a magnitude that exceeds the ability of the first responders to cope with its effects using their own resources.

- **Aerodrome rescue firefighter**

Aerodrome rescue firefighting is considered a specialist type of firefighting as airports are unique environments that place special demands on firefighters. When a civilian aircraft should crash, airports need a special type of firefighter who can perform rescue operations and fight fires in aircraft and buildings. Airport firefighters receive similar training as their municipal counterparts, but are considered as specialist because of their knowledge and experience in aviation.

- **Evaluation**

The term evaluate refers to appraise, estimate, judge, assess, rate, weigh, calculate, reckon, gauge or size up (Landau & Bogus 1990: 231). Hornby (2005:500) uses the term 'evaluate' as a verb by stating *"to evaluate means to form an opinion of the amount, value or quality of something after thinking about it carefully".* This definition is elaborated on by Ferreira (2008: 129) who states that evaluation means to judge or determine the worth or quality of something. In order to conduct an evaluation, the researcher must:

(1) Be clear about what precisely is being evaluated.
(2) Be clear about the purpose of the evaluation.
(3) Be aware of the relevant criteria or standards for evaluation.
(4) Be aware of the relevancy to the purpose.
(5) Determine if sufficient information are available about that which is being evaluated.
(6) Apply the evaluation criteria accurately to the facts as it is known.

In order to reach the primary aims of this study, an evaluation of the resiliency of airport firefighters at King Shaka International Airport has been conducted to determine the likelihood that firefighters at this airport will be able to "bounce back" after exposure to mass fatalities (deaths), mutilation of bodies, grotesque burn and other injuries, and to determine what can be done to mitigate the psychological impact of an aviation disaster and aid in the normal recovery from these events before harmful stress reactions affect job performance, careers, families and health.

- **King Shaka International Airport**

King Shaka International Airport is situated North of Durban on the Farm La Mercy Airport No. 15124, between the N2 in the East and the R102 in the West; and the Mount Moreland and Tongaat townships in the South and North respectively; covering an area of approximately 2060ha. The property is owned by Airports Company South Africa (**ACSA**).

Figure 1.1: Geographical location of King Shaka International Airport.

- **Mass casualty incident.**

An incident in which emergency service resources, such as personnel and equipment, are overwhelmed by the number and severity of casualties is considered a mass casualty/fatality incident. This term can also be used interchangeably with multi-casualty incident (Mistovich *et al.* 1999: 866). The scheduled aircraft type carrying the least amount of passengers landing at or taking off from King Shaka International Airport is the Jetstream 41 which carries 28 passengers. With a maximum of 16 firefighters being on duty at this airport at any time at KSIA, an aircraft crash will therefore result in a mass casualty incident.

- **Post-traumatic stress disorder**

Post-traumatic stress disorder, defined as a medical condition in which a person suffers mental and emotional problems resulting from an experience that shocked them very much (Hornby 2005: 1133), represents potentially the most severe and incapacitating form of human stress known, and may also result in stress-related physical complaints and disorders

(Everly 1995:7). This type of stress which occurs after (post) exposure to a traumatic event can be described as a normal reaction of normal people to abnormal situations. One of the primary goals of this study is to determine what can be done to mitigate the psychological impact of an aviation disaster, and aid in the normal recovery from these events before harmful stress reactions affect job performance, careers, families and health. An attempt is thus made to minimise the potential for post-traumatic stress development after exposure to the gruesomeness of aviation disasters.

- **Protective factors.**

Protective factors, in relation to resilience, refer to things that offer protection against anything that can potentially cause mental or psychological disorders. The concept of resilience involves the elements of risk being mitigated by protective factors to produce a positive or healthy outcome (Bonanno 2008:102) and Stewart *et al.* (1999:33). Rodgers (2002: 1025) confirms that protective factors buffer people to prevent stress symptoms manifesting.

- **Resilience**

Resilience refers to the capability of individuals to cope successfully in the face of significant change, adversity or risk (Stewart *et al*. 1997: 22). These authors further found that resilience is enhanced by protective factors in the individual and in the environment. In support of this finding, Greene (2001:17) states that resilience refers to the interaction between people and their environments. The same author proposes that the circumstances that influence resilience are embedded in family, school, neighbourhood and the larger community. For the purpose of this study, resilience will thus refer to the result of individuals interacting with their environments and the processes that either promote well-being or protect them against the influence of risk factors, as it provides a more encompassing understanding of this phenomenon.

- **Strengths**

Anything that assist people in dealing with challenges in their lives is regarded as strengths. Although not exhaustive, Saleebey (2001: 84) observes that “some capacities, resources, and

assets commonly appear in a roster of strengths". He lists the following as strengths that protect people against stress:

(1) What people have learned about themselves.
(2) Personal qualities, traits and virtues that people possess.
(3) What people know about the world around them.
(4) The talents that people have.
(5) Cultural personal stories and lore.

All these strengths will be further discussed in Chapter 2 of this study.

- **Strengths perspective**

The strengths perspective focuses on strengths and empowerment which represents a paradigm shift away from the problem-based approach (Cowger, 1994: 262). Saleebey (1997: 17) asserts that the strengths perspective recognises people's own capabilities, competencies, knowledge, survival skills, visions, possibilities and hopes. He further advises that attention be paid solely to those factors of people's lives that can contribute to their growth and well-being. Converse to this sentiment, Longres (1997: 23) asserts that life is about strengths and weaknesses. In support of this sentiment Fraser *et al.* (1999:140) caution against interventions that are based exclusively on a protection or a strengths perspective and suggests that both risk and protective factors be explored in evaluating resilience. For the purpose of this study both risk and protective factors will be explored and described.

1.8 COMPOSITION OF THE RESEARCH REPORT

This section presents the framework of the research report and specifically identifies key chapters, and how these contribute to building the body of the research. The following chapters constitute the outline of the research report:

In Chapter 1, methodological orientation is provided of the research undertaken. The research problem, research questions, aim, methodology, and the demarcation of the investigation are outlined, as well as some terms that are used consistently throughout the report. The resiliency

theory based on a strengths perspective and its application in dealing with the relationships of individuals and its environment are discussed in Chapter 2 as the theoretical framework of the study. The rest of the study is presented through the utilisation of, and against the background of this theoretical framework. Literature relating to the research topic will then be discussed, which covers various aspects such as the theoretical framework underlying the study, and international, national and local literature on the subject of resilience.

Chapter 3 provides a discussion of aviation disaster preparedness as a phase in the disaster management cycle and the various pieces of legislation pertaining to it. This enables the reader to understand aerodrome rescue firefighter preparedness within the context of a broader disaster management cycle. As disaster management model, the Pressure and Release (PAR) model is used and contextualised within an international, national and local (airport) environment.

The research methodological explanation of the questionnaire as a measuring instrument is discussed in Chapter 4, whilst the processing, categorising and interpreting of empirical data obtained from the questionnaires are presented in Chapter 5. In the concluding chapter, conclusions and recommendations are outlined on the basis of both the literature study and the empirical investigation in Chapter 6.

1.9 SUMMARY

The introductory chapter has provided a broad overview of the research, as well as its background. The problem statements and aims have been outlined. The research design and method have been clarified. Phase 1 of the research follows, which will be a detailed literature review, aimed at providing support for the theoretical aims outlined in Chapter 1. The risk and protective factors affecting the resiliency of airport firefighters will be discussed in Chapter 2.

CHAPTER 2

A RESILIENCY APPROACH AS CONCEPTUAL FRAMEWORK

2.1 INTRODUCTION

People are exposed to loss or potentially traumatic events at some point in their lives, and yet they continue to have positive emotional experiences and show only minor and transient disruptions in their ability to function (Bonanno 2004:20). However, not all people cope with potentially traumatic events in the same way. Studies reveal that some people experience acute stress from which they are unable to recover while others suffer less intensely and for a much shorter period of time. Others, however, recover quickly, but then begin to experience unexpected health problems or difficulties enjoying life the way they used to.

Firefighters are generally considered as dedicated individuals who are routinely exposed to special kinds of potentially traumatic events, and require a certain adoptively defensive toughness of attitude, temperament and training. Without this resolve, they cannot do their jobs effectively (Miller 1995: 592). According to Miller (1995: 594) firefighters display exceptional skill and courage in the performance of their duties, and refers to the National Commission on Fire Prevention and Control of the United States, who lists firefighting as the single most hazardous occupation in that country.

Support for this statement is found in Corneal *et al*. (1999: 131) who acknowledge firefighting as the most dangerous and stressful of occupations. Jeanette and Scoboria (2008:314) state that the careers of firefighters are stressful and that this occupation group may experience scenes of tragedy, destruction and horror that most people never see in their lives. To address this apparent risk, a form of intervention termed Critical Incident Stress Debriefing (CISD) was developed by "an emergency person for emergency people" (Mitchell & Bray, 1990: 89). However, Jeanette and Scoboria (2008: 315) assert that CISD is based on a premise that exposure to traumatic stressors will lead to significant psychological problems in a substantial number of individuals.

From the aforementioned paragraph, it could possibly be said that firefighters, by nature of their jobs, are prime candidates to develop PTSD or other psychiatric disorders. However, personal observation and review of literature on resilience suggest that this is not always the case.

This chapter encompasses an analysis and application of a resiliency approach to firefighters' mental health. In particular, this chapter aims to theoretically describe and discuss the concept of resiliency from a strengths perspective. The strengths perspective is chosen because it is an alternative to the deficit and problem-oriented approaches that dominate disaster literature. In addition, a perception is created by the founders of the Critical Incident Stress Debriefing (CISD) intervention developed by Mitchell (1986) that exposure to traumatic stressors will lead to significant psychological problems in a substantial number of individuals (Jeannette & Scoboria 2008: 315). This is incongruent with the strengths perspective, which advocates that the majority of individuals exposed to potentially traumatic events have strengths and protective factors that will ensure they do not all end up with post-traumatic stress syndrome.

2.1 THE STRENGTHS PERSPECTIVE

Strengths refer to a set of attributes that people possess that help them cope with life issues (Glicken 2004:77). This supports the assertion of Saleebey (2002: 84 -87) who lists the following as strengths, which will protect people against adversity:

- *What people have learned about themselves*. This refers to life experiences through which people learn whether from their successes which strengthen their behaviours, or failures which prompt them to look for alternatives.
- *Personal qualities, traits and virtues that people possess*. Saleebey (2002: 85) points out that a sense of humour, caring, creativity, loyalty, insight, independence, spirituality, morals and patience are qualities which serve as protective factors against stress.
- *What people know about the world around them*. Saleebey (2002: 85) asserts that people learn from their experiences of life, which might be formal or informal.
- *The talents that people have*. When faced with adversity, people sometimes discover talents they were unaware of which in turn empowers them (Saleebey 2002: 86).

- *Cultural personal stories and lore*. Saleebey (2002: 86) points out that these are often profound sources of strengths, guidance, stability, comfort or transformation.

Following on the strengths people possess, the strengths perspective acknowledges that people possess knowledge, abilities, resiliency, coping and problem-solving skills to help themselves. However, this perspective also acknowledges that people do become overwhelmed or experience events that render them unable to fully utilize their strengths (Slawinski 2005: 85).

Slawinski (2005: 86) elaborates on this viewpoint by stating that placing the individual in the role of "expert" in his/her own recovery process allows an increased sense of competency, reinforces past learning, and provides a platform from which new skills can be built. The strengths perspective also allows individuals to select their own support systems, which are essential to the individual's well-being over the long term. Caution is provided by Wagnild (2009: 10) who declares that resilient persons are not immune to stress, but experience the same difficulties and stressors as everyone else. However, according to Wagnild (2009:11) resilient persons have learned how to "deal with life". This principle indicates that it is important to identify and amplify the strengths amongst firefighters after exposure to critical events so that they can rediscover for themselves what has already worked for them in the past.

As stated by Glicken (2004:3) the strengths perspective is also a means of viewing the positive behaviours of all persons by helping them see that problem areas are secondary to areas of strength. From that helpful solutions can evolve, based upon the successful strategies used daily in people's lives to cope with a variety of important life issues, problems and concerns. Lastly Gicken (2004: 6) asserts that the strengths perspective recognizes the positive influences of support networks, family, culture, religious and spiritual convictions. These positive influences are helpful in the helping process.

It can therefore be concluded that the strengths perspective, which lends hope, promotes competence to manage reactions, and works in conjunction with the social supports that provide a safety net as the individual goes through the recovery process, differs from the traditional "medical model". This focuses on pathology, dysfunction and symptoms. It emphasizes the role of the expert instead of the individual as the key to recovery. Slawinski (2005: 86) further declares that a strengths-based approach allows the individual to embrace

the challenge, utilize skills, and access support systems and resources in his/her process of recovery without creating barriers to natural recovery.

Researchers are divided on the subject of whether people's strengths or weaknesses or both should be assessed in determining their resilience. Saleebey (1997:17) contends that in order for the strengths perspective to be effective - all clients must be understood and assessed in the light of their capabilities, competencies, knowledge, survival skills, visions, possibilities and hope. Contrary to this contentment, Fraser *et al.* (1999:140) cautions against interventions that are based exclusively on a protection or a strengths orientation. However, Longress (1997:23) states that "life is about strengths and weaknesses, and is so intertwined as to be inseparable". In line with the primary goals of this study as depicted on page 10, both strengths (protective factors) and weaknesses (risks) will be explored and described.

2.1.1 Strengths perspective as conceptual framework

Human beings possess the strength and potential to resolve their own difficult life situations, and by doing so they increase their strengths and contribute to the well-being of society (Saleebey 2002:114). In line with this assertion, the strengths-based perspective is considered to be highly congruent with resiliency and Greene (2007:14) holds the view that this approach consists of a set of principles, ideas and techniques that represents a shift in the professional social work role that emphasizes the resourcefulness of clients. The strengths perspective as conceptual framework for this study therefore views firefighters as having unique talents, skills, resources and life experiences to deal effectively with traumatic exposure.

Research findings of Saleebey (2002:11) and Slawinsky (2005:82) indicate that empowerment, membership, resilience, healing and wholeness, dialogue and collaboration and suspension of disbelief are factors that contribute to people's strength. With regards to resiliency, Saleebey (2002:11) states that people can rebound from serious trouble, and that individuals and communities can surmount and overcome serious and troubling adversity. With regards to healing and wholeness, she contends that healing implies both wholeness and the inborn facility of the body and the mind to regenerate and resist when faced with disorder, disease, and disruption.

2.1.2 Principles of the strengths perspective

By focusing on the strengths perspective of the individual and place of work, the attention is diverted from the negative consequences and focuses on survival instead. This view is supported by Coifman *et al.* (2007:745) who confirm that directing attention away from negative affective experience promotes resilience following extremely aversive events. In addition, Glicken (2004:11) indicates that a key idea of the strengths perspective is that skills in one area of life can be transferred to other less functional areas of life. This author then stipulates that "at the heart of the strengths perspective is a belief in the basic goodness of humankind, a faith that individuals, however unfortunate their plight, can discover strengths in themselves that they never knew existed" (Glicken 2004:36).

Saleebey (1999: 16; 2001: 13-18) points out that strengths-based approaches differ from pathology-based approaches, and lists principles of the strengths-based perspective. In the process of evaluating the resilience of firefighters, the following three principles are worthy of note:

- *Every individual, group, family and community has strengths*. In evaluating the resiliency of firefighters, it is expected that every fire and rescue service possesses strengths.

- *Trauma may cause injury, but may also be sources of challenge and opportunity*. Saleebey (1999:16) admits that trauma can overwhelm the coping capacities of people. He points out, however, that literature shows that most individuals, when confronted by trauma, are able to surmount the adversity.

- *Every environment is full of resources*. Own observation reveals that rescue and firefighting are performed as a team using assets, resources, wisdom and knowledge that can be tapped into when exposed to potentially traumatic events.

2.1.3 Words used to describe the strengths perspective.

The strengths perspective has some typical words associated with it, which Saleebey (2002: 9 -13) says provides meaning to the perspective. According to Saleebey, these words are

essential and direct us to an appreciation of the assets of individuals, families and communities. Some of these words are:

- **Empowerment**

According to Saleebey (2002: 9) empowerment "*indicates the intent to, and the process of, assisting individuals, groups, families and communities to discover the resources within and around them"*. Empowerment is thus a helping process to assist people to use their strengths to overcome their challenge. Ferreira (2004: 64) elaborates on this assertion by stating that empowering people is core in providing support. The importance of empowerment in a strengths perspective context is found in three definitions:

- Lee (1994: 13) defines empowerment as "*a process ... that aims to reduce the powerlessness that has been created by negative evaluations based on membership of a stigmatized group".*

- Hepworth and Larsen (2002: 438) define empowerment as "*enabling groups or communities to gain or regain the capacity to interact with the environment in ways that enhance resources to meet needs, contribute to their well-being and potential, give their life satisfaction, and provide control over their lives to the extent possible*".

- Adams (2003:8) defines empowerment as "*the means by which individuals, groups, and/or communities become able to take control of their circumstances and achieve their own goals, thereby being able to work towards helping themselves and others to maximize the quality of their lives".*

Of the three definitions, the first two refer to groups and communities while the last one includes the individual. Empowerment should include the individual because eventually it is the individual that is disempowered.

- **Membership**

Membership is viewed as an important experience in people's lives. Saleebey (2002: 10) warns that to be without membership is to be alienated. He further asserts that people

"need to be citizen, responsible and valued members of a community". From a strengths perspective, recognize that all people are entitled to dignity, respect and responsibility that are associated with such membership. In evaluating the resiliency of firefighters, membership becomes very relevant as it acknowledges that people must often band together to have their needs met. In addition, it must be noted that there is strength in numbers.

- **Resilience**

Empirical evidence exists that people do rebound from serious trouble, that individuals and communities do surmount and overcome serious trouble and adversity (Saleebey, 2002: 11). He further describes resilience as a process of interaction between a person and his environment, which can be explained by the ecosystem's approach on which the strengths perspective is based.

- **Healing and wholeness**

According to Saleebey (2002: 11) the healing process requires a supportive relationship between the individual and his/her environment for healing to take place.

- **Dialogue and collaboration**

Humans need relationships to grow and develop and therefore will always seek to connect with other people (Saleebey 2002: 12). Interpretation of the above words and descriptions of these words provide an understanding of the concept of a strengths perspective. Personal experience in the rescue and firefighting services supports the assertion that all five of the above-mentioned attributes, when present, enhance the resilience of an individual and a team.

2.1.4 Resiliency in strengths-based perspective

According to Bonnano (2004: 20) resiliency is a phenomenon that enables an adult to maintain relatively stable, healthy levels of physical and psychological functioning even after a highly adverse event. However, according to Bishop *et al.* (2006: 109) research on resilience first emerged as a major theoretical topic around the study of children of schizophrenic

mothers. Studies suggested that despite their high risk background, these children still thrived, leading to an increasing interest in the reasons behind individuals' varied responses to adversity.

Thereafter, research on resiliency expanded to include poverty, community violence, chronic illness and other catastrophic life events. Ultimately the research conducted, enabled researchers to identify three factors that were involved in the development of resilience, namely (1) attributes of the children, (2) their families and (3) their social environment. In support of this concept, Bishop *et al.* (2006:109) refer to resilience as *"a series of adaptive strategies employed by individuals to aid them in managing traumatic stress and coping with disasters and disruptive events"*. These strategies may include using social support, accepting change, developing new skills as an aid towards self-development based on challenges, and seeing things in the long term.

In gaining an understanding of the resiliency of airport firefighters when exposed to the gruesomeness of aircraft disasters, it is important to note that when people are classified as "resilient", it does not mean that they are immune to the effects of trauma. Bonanno (2004: 24) confirms that resilient individuals do experience some emotional pain and sadness, whilst Silver (2004: 49) confirms that displaying emotional reactions such as sadness and anxiety may not represent psychiatric disorders, but rather a normal response to an abnormal event. The above discussion indicates that some firefighters, after being exposed to potentially traumatic events, might display signs of being negatively affected by them, but over time will return to their former self, and might even be mentally stronger than before the exposure.

2.2 THE CONSTRUCT OF RESILIENCE

Resilience as a construct is part of a "positive psychology" movement that focuses on identifying the strengths of an individual when faced with adversity rather than on his or her weaknesses such as depression, anxiety and stress (White *et al.* 2008:9). Charney (2004: 195) elaborates on this explanation with a finding that the construct of resilience refers to the ability of individuals to adapt successfully in the face of acute stress or trauma, maintaining or rapidly regaining psychological well-being. It thus becomes clear that in order to determine if someone is

resilient, that person must have been subjected to a potentially traumatic event, and successfully dealt with it.

It can be argued that individuals with greater resilience would be expected to overcome a traumatic event more successfully than individuals with low resilience. The goal of positive psychology is to identify the qualities that help individuals, communities and societies to thrive, as opposed to focusing on their weaknesses (Dunn & Dougherty 2005: 308). Resilience thus refers to how an individual reacts and adapts to exposure to potentially traumatic events. Highly adverse events, such as aircraft disasters resulting in multiple fatalities, are considered as "potentially" traumatic because not everyone experiences them as traumatic. The term "potentially traumatic events" will thus be used for this research because of the given reason.

Research on mass casualty events has overwhelmingly focused on pathological response (Hobfoll *et al.* 2009:138). However, emerging research has suggested that in the aftermath of mass casualty, the majority of persons do not report distress and may be termed resilient (Bonanno *et al.* 2007:671). However, this does not mean that resilient people do not experience stress. Research has shown that resilient individuals may experience some short-term changes in their emotional and physical well-being, but their reactions to potentially traumatic events tend to be relatively brief, and usually do not impede their ability to function.

Thus resilient individuals among an exposed population report little or no psychological symptoms and evidence with the ability to continue fulfilling personal and social responsibilities and to embrace new tasks and experiences (Bonanno *et al.* (2007: 671). For example, research findings (Freedman 2004: 377) attribute the fact that the majority of firefighters who responded to the World Trade Centre remained resilient was due to their social backgrounds, the occupational community to which they belonged, and the collective ways of coming to terms with disaster and death that they had learned through their professional training and socialisation. This finding is supported by Greene (2007:4) who states that resilience is thought to be effective in alleviating distress and promoting well-being at the individual, family and community level.

Initial evidence for widespread adult resilience to potentially devastating traumatic events came from studies of bereavement (Bonanno *et al.* 2002/ 2005); and more recently, direct exposure to the 9/11 terrorist attack on the World Trade Centre in New York City (Bonanno *et al.* 2005). The concept resilience was historically founded by work published in the early 1970s (Anthony 1974; Garmecy & Neuchterlien 1972; Garmezy *et al.* 1979). Resilience of specific populations followed. Much later research findings conducted on resilient children were published (Garmecy 1974; Garmecy & Rutter 1983:12; Werner & Smith 1988).

The phenomenon of resilience was further researched focusing on those who "*bounced back after exposure to negative life experiences*", to determine which factors enabled them to survive, whilst the same factors negatively affected others. Instead of focusing on individual deficit, the new approach focused on individual strengths and thus the concept of resilience emerged (Blum; Smith and Carlson 1997:231; McNeely & Nonnemaker 2002:29; Minnard 2001:233; Werner & Smith 1992:55).

Exposure to negative life experiences does not necessarily imply potential negative results, but can also result in positive growth. In support of this statement, Dent and Cameron (2003: 5) suggest that resilient individuals are often able to thrive in the face of what appears to be overwhelming odds, which Tedeschi and Kilmer (2005:233) calls post-traumatic growth (PTG). Resilience differs from post-traumatic growth as people who display resilience have adjusted successfully despite adversity, whereas persons who experience post-traumatic growth are those who are transformed in the aftermath of the trauma. On the strength of this assertion it can be concluded that when exposed to potentially traumatic events, all people are transformed. After time some people return to their former state, others show positive growth, whilst others might be damaged to the extent of being classified as suffering from post-traumatic stress disorder.

2.2.1 Defining resilience.

Many authors, including Block and Block (1980: 48), Rutter (1987: 316) and White *et al.* (2008: 9) have defined resilience. While these definitions differ, there are fundamental similarities amongst them, namely adaptation, capacity to bounce back, inner strengths, coping, self-esteem and capability to grow after exposure to potentially traumatic events.

A variety of operational definitions are also available. For example Conner and Davidson (2003: 78) identify resilience as personal qualities that enable individuals to flourish when exposed to adversity whilst Richardson (2002: 307) describes resilience as an internal motivational force that drives each individual to seek wisdom, self actualization, altruism and inner spiritual peace. Newman (2005: 227) defines resilience as "*positive adaptation when exposed to a traumatic event"*. Garmecy (1993: 129) states that:

> *the central element in the study of resilience lies in the power of recovery and in the ability to return once again to those patterns of adaptation and competence that characterized the individual prior to the pre-stress period….to spring back does not suggest that one is incapable of being wounded or injured. Metaphorically, it is descriptively appropriate to consider that under adversity, a resilient individual can bend ... yet subsequently recover...*

The above definitions indicate that resilience is a complex concept, but can be simplified as *"the ability to bounce back from adverse life experiences".* According to Higgins (1994: 1) resilience implies that people are able to negotiate significant challenges to develop the important tasks which confront them as they grow, while Donald, Lazarus and Lolwana (2002: 204) focus on people being able to rebound from adversity and being flexible and adaptable. Henry (1999:521) defines resilience as *"the capacity for successful adaptation, positive functioning, or competence despite high risk, chronic stress, or prolonged or severe trauma".*

The definition of resilience selected for this study is provided by Rutter (2007: 205) who defines resilience as *"a person's ability to adapt successfully to acute stress, trauma or more chronic forms of adversity".* This definition is selected because it refers to acute stress and trauma, the focus of this study.

2.2.2 Theoretical concepts of resilience

The concepts of resilience is explained by Rutter (1985:598) and Gilligan (2001:5) who suggest that resilience is not a fixed attribute, but a cluster of processes that enables people to adapt to risks that are unavoidable in life. Werner and Smith (1982: 84-93) and Gilligan (1997:67) concur with this view of resilience as they list various personal qualities and behaviours that they believe contribute to the cultivation of resilience, such as an easy-going

temperament, high intelligence, a repertoire of problem solving abilities and the belief that one can influence events, and make a difference in the present and the future (Gilligan 2001: 5).

Other authors focus on skills in their definitions of resilience. Corsini (2002:834) suggests that resilient people are those who are able to deal successfully with stresses and traumas that would devastate others. Kazdin (2000:64) states that ego resilience implies resourceful, flexible responses to new or stressful situations. Support for this view is given by Henderson and Milstein (1996:34) as they hold the view that resiliency is a process of coping with disruptive, stressful or challenging life events in a way that provides the individual with additional protective and coping skills that existed prior to the disruptive event.

The majority of individuals exposed to potentially traumatic events show the type of healthy functioning suggestive of resilience (Bonanno 2004:22) He also cautions against interference with resilience in these individuals by clinical intervention. Bonanno (2004:23) accedes that even among these resilient individuals, the majority reported experiencing at least some "yearning and emotional pangs". Almost all participants reported intrusive cognition and pondering at some point early after the loss. Bonanno's sentiment is supported by Tucker *et al*. (2002:469) who found that mortuary body handlers in the aftermath of the Oklahoma City Bombing have been described as showing "unexpected resilience", by displaying relatively little distress.

2.2.3 Benefits of resilience

The benefits of resilience go beyond just helping people feel good. Newman (2005:228) holds the view that resilience can help reduce and even prevent stress, and refers to studies that prove being resilient has significant health consequences. This assertion is supported by Wagnild (2009: 10) who confirms that research has shown that resilience protects against depression, anxiety, fear, helplessness and other negative emotions, and thus has the potential to reduce their associated physiological effects.

People with good relationships, the behaviour most frequently associated with resilience, tend to be healthier than those without good connections to others. Similarly, people who

maintain an optimistic view of the world tend to be healthier. Research has also shown that some of the behaviours associated with individual resilience are related to longevity. Good relationships, optimism and the ability to find meaning in difficult life experiences have all been linked to resilience (Newman 2005:228). The importance of relationships is emphasised by Luther (2006: 780) who states that resilience rests fundamentally on relationships. On the strength of this discussion, the firefighter's relationship with himself/herself, members of their immediate family and peers will be further discussed as an ecological system further on in this chapter at *micro* (individual), *meso* (family) and *exo levels* (working environment).

2.2.4 Resilience as trait and process

The mechanism of resilience is portrayed as a trait inherent in individuals, whilst others portray it as a process.

- **Resilience as personal trait**

  Personality traits are innate qualities that make one person distinct from another (Wagnild 2009: 13). Based on this definition, literature contains several studies which focus on resilience as a group of traits of individuals.(Beardsley & Podorefsky (1988); Cowan & Work 1988; Garmecy 1993; Hechtman 1991; Miller 1988; Mulholland *et al.* 1991; Rabkin *et al*. 1993; Wagnild & Young 1993). Wagnild and Young (1993:165) view resilience as a trait by defining resilience as *"a personality characteristic that moderates the negative effects of stress and promotes adaptation…"*

- **Resilience as process**

  According to Fine (1991: 499) the mechanism of resilience is a two-stage process. In the acute phase of the process, energy is directed at minimizing the impact of the stress and stressor. In the reorganization phase, a new reality is faced. This researcher emphasizes the importance of individuals belonging to social groups, have hope, find meaning and purpose in their lives.

More examples of studies investigating resilience as a process are provided by Baumeister (1982) and Steele *et al*. (1993). Both researchers focused on the effects of threats to self-esteem on individuals' self-concept.

2.3 A RESILIENCE MODEL

According to Wagnild (2009: 20) people have the capacity to respond to adversity with resilience. She further states that responding with resilience not only means bouncing back, but also learning from the experience and growing stronger as a result. This assertion will be justified as positive growth further in this chapter. Although everyone can respond with resilience, the degree of response is dependent on the strength of his/her resilient core, founded in grounded-theory research by Wagnild and Young (1990). The model of resilience chosen for this study is the Resilience Scale developed by Wagnild and Young (1990) which is based mainly on five characteristics of resilience which they termed The Resilience Core.

2.3.1 The Resilience Core

Wagnild and Young (1990) came to the conclusion that resilience was made up of five characteristics namely a purposeful life, perseverance, equanimity, self-reliance and existential aloneness, which they call a resilience core. Wagnild (2009: 17) elaborates on the importance of this resilient core by her assertion that a strong resilience core will enable a person to bounce back, learn and grow from life's difficulties to exhibit a very healthy resilience response. A brief description of each characteristic is given to promote understanding of each, as listed below:

- **Self-reliance**

Self reliance refers to a belief in oneself and one's capabilities and the ability to depend on oneself and to recognize personal strengths and limitations (Wagnild 2009: 19).

- **Purposeful life (meaning)**

The realization that life has a purpose and the valuation of one's contributions; meaningfulness conveys the sense of having something for which to live (Wagnild 2009: 17).

♦ **Equanimity**

A balanced perspective of one's life experiences; equanimity connotes the ability to consider a broader range of experience and to take what comes, thus moderating extreme responses to adversity (Wagnild 2009: 18).

♦ **Perseverance**

The act of persistence despite adversity or discouragement; perseverance connotes a willingness to continue the struggle to reconstruct one's life and to remain involved and to practise self-discipline (Wagnild 2009: 18).

♦ **Existential aloneness**

The realization that each person's life path is unique; while some experiences are shared, there remain others that must be faced alone. Existential aloneness confers a feeling of freedom and sense of uniqueness (Wagnild 2009: 19).

♦ **Resilience supports**

The Resilience Scale, developed by Wagnild and Young (1990) will be used to measure the level of resilience amongst a group of airport firefighters. Wagnild (2009: 20) confirms that the higher the measured resilience, the greater the ability to respond with resilience to potentially traumatic events. However, it must be noted that individuals with low measured resilience does not mean they have zero resilience, as everyone is resilient to some degree. The resilience of these individuals can be strengthened (Wagnild 2009: 80). It can be strengthened with resilience supports such as seeking social support, taking care of your health, engaging in life and balancing recreation, rest and responsibilities. Using Wagnild and Young's Model of Resilience, this concept will be further clarified.

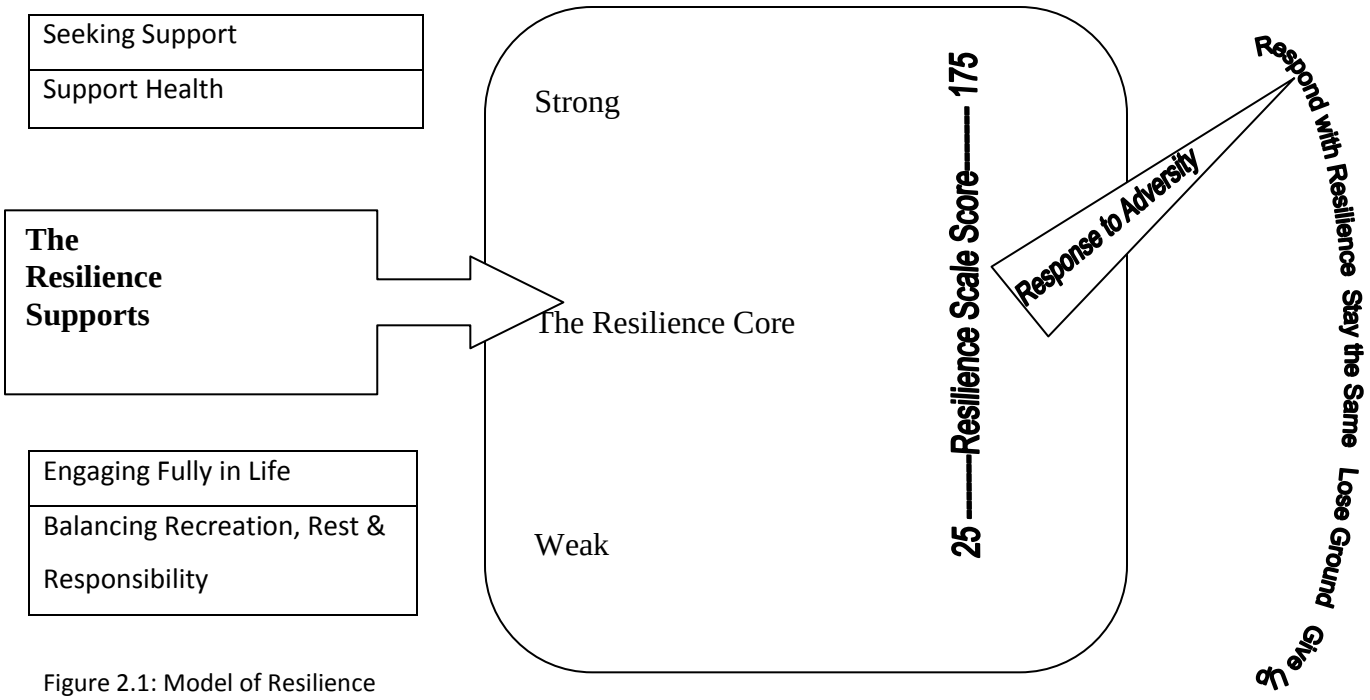

Figure 2.1: Model of Resilience

Source: Wagnild (2009: 21)

Figure 2.1 demonstrates how people, when exposed to adversity will generally respond. They will either respond with resilience, stay the same, lose ground or even give up, depending on the strength of their resilience core, which is dependent on the resilience supports they use. From the model of resilience it can also be deduced that individuals with a low resilience core can respond to adversity more effectively by the use of resilience supports.

2.4 RESILIENCE AT DIFFERENT LEVELS IN ECOLOGICAL SYSTEM

As indicated under the benefits of resilience earlier in this chapter, resilience is explored and discussed at a *micro level* (individual), *meso level* (family) and *exo level* (working environment).

2.4.1 MICRO-LEVEL: THE INDIVIDUAL

Before the characteristics of resilient individuals can be explored and discussed, it is considered appropriate to note that persons, who do not display resilient characteristics, should not automatically be classified as vulnerable, because resilience can be acquired.

Morland, Butler and Leskin (2007:55) refer to recommendations made by the American Psychological Associations' Task Force on Resilience in Response to Terrorism, as ways to build resilience namely:

(1) Seeing stress as a challenge to solve, rather than a threat to avoid, whilst being flexible and accepting change as a natural part of life.

(2) Teaching active coping strategies to manage stress and learning to have a positive view of oneself and others build resilience.

(3) Maintaining and practising self-care throughout the recovery process, developing a positive attitude and fostering hope, whilst staying connected and developing a positive supportive social network are all proven ways to foster resilience.

The vast majority of individuals exposed to potentially traumatic events do not exhibit chronic symptoms of stress, but display the type of healthy functioning suggestive of the resilience trajectory (Bonanno 2004:22). In verification of this finding, Bonanno, Rennicke and Dekel (2005: 984) refer to evidence that demonstrated resilience in response to the September 11 attacks at which survey results indicate that more than 40% did not report a single post-traumatic stress symptom.

Tedeschi and Kilmer (2005:231) hold the view that individuals with the following attributes are resilient:

- a positive temperament
- good intellectual functioning
- self-efficacy
- positive self-worth
- perceived competence
- sound problem-solving skills
- internal locus of control
- accurate and realistic attributions of control
- positive future expectations
- A sense of optimism is resilient.

A more simplistic description of "resilient persons" is given by Wagnild (2009: 10) who describes them as persons who are self-confident, understand their own strengths and abilities and have confidence in their own ability to persevere because they have done so before, and anticipate rather than fear change and challenge.

In order to perform an assessment of the likelihood of the airport firefighters at King Shaka International Airport, after exposure to severe trauma associated with commercial aircraft accidents, to be sufficiently resilient to remain fit for duty, the characteristics of resilient individuals must be understood. However, it must be noted that qualities of a person alone are not sufficient to predict resilience, but other factors such as social support are required (Kent & Davis 2010: 427). Furthermore empirical evidence suggests that biographical characteristics such as marital status, sex and education can be used to describe resilient individuals.

- **Marital status**

According to Mancinni and Bonanno (2006: 975) resilience is most prevalent in married young males. The relevance of this finding is in the statistical fact that the majority of firefighters at King Shaka international Airport fall within this category and thus bodes well for the objective of this study.

- **Gender**

With reference to gender, Stein *et al.* (2004: 110) and Wadsworth and Santiago (2008: 400) conclude that females are generally found to experience more stress and is more affected by stress. Menendez *et al.* (2006: 905) find justification for this statement that *"women's role as caregivers may predispose them to stress, as their feelings of responsibility and their involvement in social networks are greater".* From this finding it can be deduced that a group made up of more male than female firefighters will be more resilient to potentially traumatic events than a group consisting mostly of female firefighters.

- **Education**

A direct relationship has been found between education and resilience by Mancini and Bonanno (2006:975). They found that more education is associated with more resilience, and that people with higher income levels are more resilient than those with lesser incomes.

- **Hardiness.**

The opinion held by Maddi *et al.* (2002: 3) is that that hardiness is a combination of attitudes and skills that provides the courage, motivation and strategies to transform stressful circumstances from potential disasters into advantages and growth opportunities. Related to this notion, McCalister (2006: 184) describes hardiness as *"a constellation of personality characteristics that function as a resource in the encounter with stressful life events"* while Bartone (1999: 73) holds the view that hardy persons have a high sense of life and work commitment, a greater feeling of control, and are more open to change and challenge in life.

According to Bartone (1999: 73) these individuals interpret stressful experiences as a normal aspect of existence, a part of life that is overall interesting and worthwhile. From this assertion in can be concluded that hardiness is congruent with the focus of this study, namely resilience, and will therefore be evaluated in addition to resilience amongst firefighters. The protective function of hardiness is empirically supported (McAlister *et al.* 2006: 184). These researchers group hardiness into three basic elements, namely:

(1) Having hardiness includes the ability to perceive change as a challenge.
(2) Maintaining a sense of purpose and deep commitment to the people and activities in which they are involved.
(3) Perceiving a sense of personal control in handling life's events and activities.

Hardiness is thus perceived as an important protective factor when firefighters must accept the challenge to deal with mass casualties and trauma associated with aircraft disasters and be committed to each other and their job for a successful outcome. Bonanno (2004:25) refers to evidence that suggests that the personality trait of hardiness consists of three dimensions, namely:

(1) Being committed to finding meaningful purpose in life.
(2) Believing that one can influence one's surroundings and the outcome of events.
(3) Believing that one can learn and grow from both positive and negative life experiences, helps to buffer exposure to extreme stress.

The same author holds the view that hardy individuals are more confident and better able to use active coping and social support, thus helping them deal with the distress they experience. Bishop *et al.* (2006:110) substantiate this sentiment by their findings that hardiness helps to shield individuals from extreme stress. Skodol (2010: 112) elaborates on this assertion by stating that hardiness is a personality construct that comprises *control* (a tendency to feel and act as if one is influential rather than helpless in the face of external forces), *commitment (*a tendency to be involved, and to find purpose and meaning in life's activities and encounters rather than to feel alienation, and *challenge* (a belief that change is normal in life). Control, commitment and challenge are general personality traits of firefighters (Mitchell & Bray, 1990: 26), and from the description of hardiness it can be concluded that these emergency workers possess factors that promote their resiliency.

The importance of hardiness is highlighted by Maddi *et al.* (s.a 3) who confirm that individuals who possess control, commitment and challenge will transform stressful circumstances into their advantage, however difficult it may be, and Maddi and Khoshaba (2005: 13) who view hardiness as the key to resilience. Hardiness and resilience can thus be described as being congruent.

The above statements point to the assumption that firefighters would be more resilient than other occupation groups such as office workers, mechanics and accountants due to their inherent requirement to control their environments, their commitment to their callings and their knowledge that their daily routines can change at any time exposing them to potentially traumatic events.

- **Self-enhancement**

Self-enhancement promotes resilience as it can be adaptive and promotes well-being (Bonanno 2004:25). This assertion is based on the premise that self-enhancement is associated with benefits such as high self-esteem. Bishop *et al.* (2006:110) gives an example to substantiate this sentiment by referring to a study of individuals in attendance at the World Trade Centre during the 9/11 attacks where self-enhancers were found to have more active social networks, and were rated as better adjusted by their close friends.

- **Repressive coping**

Repressive copers refer to individuals who avoid unpleasant thoughts, emotions, and memories by emotional dissociation. Mancini and Bonanno (2010: 258) found that a perhaps an unlikely source of resilience to potentially traumatic events is found among people who habitually employ coping mechanisms that minimize negative effects. When exposed to the gruesomeness of aircraft disasters, personal experience in dealing with fatalities indicates that the ability to disassociate emotionally from the scene, acts as protective factor and allows firefighters 'to get the job done". However, it must be noted that this is only a temporary measure and it might be required to deal emotionally with the trauma afterwards.

- **Positive emotion, laughter and communication**

One of the ways repressors and others showing resilience appear to cope well with adversity, is through the use of positive emotion and laughter (Bonanno 2004:26). Since this observation was made, a multiple studies have shown that positive emotions have beneficial effects on individuals (Ong *et al.* 2010: 81). Moran and Massam (1997: 2) emphasise the importance of positive emotion and laughter by asserting that successful teamwork is an essential part of emergency work, and requires effective communication. These authors then declare that laughing is one of the most important means of communication. Emergency workers also use slang, which serves a protective function and involves creating a sense of belonging, a unique identity, and a private means of communication (Moran & Massam (1997: 4).

In addition to act as communication tool, humour can also provide an emotional bonding by helping people put negative thoughts out of mind and provides social benefits. However, the reader is also cautioned that there are also negative connotations attached to using laughter as protective measure.

As far back as 1971, Kubie (1971:862) expresses concern that humour can prevent a person from dealing with anxiety, and asserts that it is more important to face anxiety than to suppress it with humour. However, the same author acknowledges humour does have a positive side such as defusing an intense situation. It is thus concluded that humour is a strength that can serve as protective measure, but it must be used wisely. Moran and Massam (1997: 6) further, rightfully, state that people lacking in humour should not be seen as abnormal as lack of humour may just be a normal human characteristic.

- **Individual personality traits**

Research findings (Bishop *et al.* 2006:113) indicate that self-efficacy, realistic appraisal of the environment, social problem-solving skills, sense of direction or mission, empathy, adaptive distancing and genderless sex role behaviour are all individual personality traits that will enhance resiliency.

The training and personality style of firefighters prepare them to deal with potentially traumatic events Regehr *et al*. (2005: 423). In addition Bonanno (2004: 25-27) refers to studies which reveal that lack of social support, low intelligence and lack of education, family background, prior psychiatric history, and aspects of the trauma response itself are predictors of post traumatic stress disorder. He then suggests that these factors, if inverted, would predict resilient functioning, whilst warning against a perception that all people are resilient.

2.4.2 Meso-level: The family

Families are a social system that fulfils important functions for its members and for society, such as:

(a) Family formation and membership

(b) Economic support

(c) Nurturance and socialisation

(d) Protection of vulnerable members (Patterson 2002:234).

One way of conceptualising a resilient family is the degree to which they are able to successfully fulfil their functions so that individual family members and other social systems benefit. Fiona Walsh (1996: 261) earlier defines family resilience as *"the ability to withstand and rebound from crisis and adversity"*, while Silberman (2001: 55) states that strong families are able adapt to changing circumstances, and have a positive attitude towards the challenges of family life. They deal with challenges by talking to each other, supporting each other in times of need, seeking external support when it is beyond the family's capability, pulling together to form a united front and to find solutions. This viewpoint is supported by Mancini and Bonanno (2006: 975) who state that in New York City after September 11, resilience was most prevalent among married as opposed to unmarried, divorced or separated individuals.

Similar to micro (individual) level, agreement has not been reached in determining if family resilience is a trait or a process. McCubbin and McCubbin's 1996 Model of Family Stress, Adjustment and Adaptation, as referred to by Orthner, Jones-Sanpei and Williamson (2004: 159) was used. This model focuses on the protective role of resilience in families and lists five major assumptions for family resilience, namely:

(1) Families experience stress over the course of the life cycle.
(2) Families possess strengths that protect and assist them in recovering from negative experiences.
(3) Families benefit and contribute to a network of relationships in their communities.
(4) Families seek to make meaning of and develop shared understanding of negative experiences.
(5) Families faced with crisis seek to restore order and balance to their lives.

Walsh (1998:4) defines resilience in families as the *"capacity to rebound from adversity, strengthened and more resourceful"*. She continues her definition by saying:

> [*w]e cope with crisis and adversity by making meaning of our experience: linking it to our social world, to our cultural and religious beliefs, to our multigenerational past, and to our hopes and dreams for the future (Walsh 1998: 45).*

In contrast to this definition, Conger and Conger (2002: 362) and Patterson (2002: 349) conceptualise family resilience as a process that families use to adapt and function following an exposure to trauma or negative experience. Orthner, Jones-Sanpei and Williamson (2003: 6) list a family's sense of cohesion, ability and willingness to communicate and access to social support as processes of family resilience. Family hardiness is another resiliency factor that refers to the internal strengths and durability of the family (McCalister 2005: 382).

The concept of the family is derived from the Latin term *familia,* the root word of *familiar*. It means "household" and includes everyone who lives there, including family members, housekeepers, boarders, live-in relatives and friends (Figley 1995:345). Patterson (1999:31) refers to family as a system in defining family, stating that a family system is two or more individuals (family structure) and the patterns of relationship between them (family functioning). As stated by Regehr (2005: 430) family structure and family functioning develop amongst firefighters after working together over a period of time. He then refers to the camaraderie and tight bonding that develop between firefighters and their peers as "*the brotherhood of firefighters*".

According to Bishop *et al*. (2006:113) the most important factor in promoting resilience is a positive, caring relationship, which includes the social network ranging from family, friends and work. The family is one of society's oldest and most resilient institutions. Research found that strong families are characterized by showing appreciation and affection, commitment, positive communication, enjoyable times together, spiritual well-being, and the ability to manage stress and crisis effectively (Defrain & Asay 2007:10).

This finding supports Smokowski, Reynolds and Bezruczko (1999: 427) who state that the social relationships among family members are by far the best predictors of behavioural outcomes, and Masten (1994: 5) who believes that support and affection from one or more adults are often cited as a crucial factor for buffering the effects of risks, thus enhancing resilience. Agreement to these findings is found in Tedeschi and Kilmer (2005:23) who confirm that a

warm, family environment with quality parenting and a structured, stable home contributes to the resilience of people. Wadsworth and Santiago's (2008:399) research findings concur that family-based, coping, focused interventions have the potential to promote resiliency.

However, it does not mean that individuals from families that do not possess the above-mentioned qualities are not resilient. This assertion is substantiated by research findings Garmecy (1993: 132) and Beardsley and Podeorefsky (1988: 267) who studied children who sustained their competency despite being raised in poverty, and adolescents who were functioning well in spite of living with parents with major affective disorders. In both studies external support was provided through established close relationships with friends and/or adults outside the family.

In line with the theoretical framework, resiliency theory in conjunction with ecological thinking used to explore, describe and explain the factors affecting the resilience of airport firefighters, a discussion on family support for firefighters and employer support to families will now follow:

- **Strengthening families**

  Families generally overcome crises by pulling together rather than apart, reframing the crisis in a more positive, manageable light and seeking help (Defrain 1999:9). Families also participate in practices such as having family meetings, giving each other time out when the need arises, and maintaining family time that assist them during adversities. During a typical 24 hour shift, firefighters live at their station. They buy groceries and prepare meals together, sleep in common rooms, clean the station, maintain their equipment, and have great opportunity for personal interaction (Varvel *et al*. 2007:459)

  Sharing a value system strengthens the family and helps family members cope with adversity and challenges. These shared values are expressed through their religion and their ethical and moral belief system. Research findings (Silberberg 2001:56) indicate that having a common value system induces a sense of togetherness or belonging which in turn provides the family resilience to deal with changing circumstances and life transitions. Furthermore, rituals, such as having meals

together, celebrating birthdays or Christmas according to family traditions, reinforce this sense of belonging and emphasize family values. It can thus be concluded that sharing a value system facilitates processes that strengthen families, and these processes entail rituals and practices that emphasize the importance of family.

- **Family support**

The support of family is paramount to reducing the impact of highly stressful work on firefighters (Regehr *et al.* 2005: 424). This is substantiated by research findings (Regehr *et al.* 2002: 957) that firefighters who had higher levels of family support were less likely to take mental health stress leave from work following a traumatic event. Following disasters, maintaining family connections and supporting family traditions and beliefs in the face of hard times are thus very important.

This could mean meeting spiritual needs as well as a sense of cohesion and working together to address the consequences of the disaster. Pitching in and working at recovery is very important for all members of the family (Blundo & Greene 2007:171). This is especially true with reference to firefighters who must work together as one unit when dealing with disasters, but at the end of their shift must go home and deal with the consequences of this exposure there. Substantiation of this view is found in the findings that *"as an intimate social support system, family members promote recovery in at least four separate and related ways"*, namely:

- Detecting traumatic stress
- Confronting the trauma
- Urging the recapitulation of the catastrophe
- Facilitating resolution of the trauma-inducing conflicts (Figley 1995: 345).

2.4.3 Exo-level: The working environment

As asserted by Regehr *et al.* (2005:425), work and family cannot be viewed as separate spheres, but rather as highly interrelated spheres. In line with this assertion, Pitman *et al.* 2004: 250) find that workplace factors have significant influence on the family and that family factors influence

commitment to the workplace, ultimately job performance. Support for this assertion is found in Regehr (2005: 425) who asserts that organisations with policies and programmes that support workers, and reduce the stress brought home to families may enhance the family - work fit, and therefore enhance commitment. With reference to firefighters, Regehr *et al*. (2005: 425) find that when emergency workers think that management is supportive of them following difficult situations, and that management is sensitive to their needs and those of their families, it will have a positive effect on them.

Research findings (McCalister *et al.* 2006: 190) emphasise the importance of support at work from co-workers and supervisors as potentially protective resources at the workplace. Empirical evidence suggests that cohesion, supervisor support, social support and connectedness enhance resilience at work. Resiliency factors are common factors in those who show adaptive outcomes to potentially traumatic events (Bishop *et al.* 2006:113). These authors also refer to studies that reveal that by understanding the resiliency factors, opportunities to promote resilience can be created. In the workplace interpersonally-related protective factors as well as individual personality traits are factors that can enhance resiliency (Bishop *et al.* 2006:113).

- **Cohesion**

Cohesion is defined by Steinhardt *et al.* (2003: 383) as *"a dynamic process which is reflected in the tendency for a group to stick together and remain united in the pursuit of its goals and objectives"*. This definition accurately describes the collective effort required by firefighters when exposed to potentially traumatic events such as aircraft disasters.

Following on the definition above, it is stated by Bishop *et al. (*2006: 115) that immediately following an event, employees need a chance to pull together so that cohesion of the group is enabled to stay intact. This fact is considered very important following exposure to the trauma associated with commercial aircraft accidents.

- **Supervisor support**

Supervisor support is agreeably defined by Steinhardt *et al.* (2003: 383) as *"employees' perceptions of the quality of their immediate manager's supportiveness"*. This definition refers to the perception of the approachability of managers, how they treat their employees

with respect and being helpful with work-related issues. Bishop *et al.* (2006:115) confirm that the visibility of senior leadership is important because employees witnessing that their well-being is considered by management is the human touch that employees crave. These researchers then suggest that group cohesion should be encouraged by management and the firefighter's courage, bravery, dedication and other positive attributes should be acknowledged.

In lieu of the support from family, social events held weeks after potentially traumatic events to which family members were invited, have been found to be useful (Bishop *et al*. 2006:115). Support for the above findings of McCalister *et al.* (2006: 184) states that the perception of supportive supervisors has a positive influence on an employee's perception of available coping resources, and act as protective resource. Finally Steinhardt *et al.* (2003: 383) assert that the interpersonal relationship between worker, co-workers and supervisors, in conjunction with hardiness and group cohesion positively relate to job satisfaction, thus enhancing resiliency at work.

- **Social support at work**

Resilient people utilise social support systems more effectively than vulnerable people (Smokowski *et al.* 1999:427). The same authors further find that the relational bonds between individuals and their peers, friends and supportive parents buffer risk and facilitate adaptive development. Gibbons and Olk (2003:341) support this assertion by their findings that friendship networks affect individual and organisational well-being and that people who see themselves as members of a particular group are likely to identify with other members of that group.

Social support refers to an individual's perception of how much he or she can rely on others for emotional support, as well as for other forms of valuable interpersonal resources (Williams & Galliher 2006:859). It thus refers to the functions performed for the individual by family, friends and co-workers. Cohen and Wills (1985:312) precede this finding by stating that individuals with high levels of social support have been found to report better well-being, and appear to be protected against stressful life events.

With reference to firefighters, Cowen and Ferrari (2004:122) find that firefighters, in addition to social support systems outside of work, also have support systems within the work setting such as their sense of community. Sarason (1974:13) defines sense of community as willingness to maintain interdependence with others, perceive similarities with others, and feel a part of a larger group or structure. Social support is not only considered as a strength that will protect people against the negative consequences of exposure to potentially traumatic events, but is also acknowledged as a factor that contributes to post-traumatic growth (Prati & Pietrantoni 2009: 365).

Lin (1986) lists the community, the social network and intimate and confiding relationships as three major sources of social support. Ehrenreich (2001:54) supports this finding by stating that communities have strengths and resources, which can be a powerful tool for mitigating the effects of disasters in individuals. Research (Defrain & Asay 2007:10) find that strong families are characterized by showing appreciation and affection, commitment, positive communication, enjoyable times together, spiritual well-being, and the ability to manage stress and crisis effectively. Risk and resiliency theory has helped individuals to focus on the processes that emphasize family strengths, such as family assets and community resources that can enhance family functioning and resilience (Silberberg 2001:52; Walsh 2002:130). As mentioned previously, researchers have described the relationship amongst firefighters as that associated with a family and a community.

Freedman (2004:380), with reference to the resilience of firefighters declares that a cardinal value of the firefighter, expressed as *"never let a guy down"*, is based on necessity for interdependence in their work. The goals of their work are to save life and property and to prevent death and destruction. Freedman (2004:380) further states that firefighters are like a community as they live together and fight together, but are always there for each other. In addition the kinship-like relations among firefighters is crucial to their ability to get the job done and to their survival at a scene, whilst their work is based on faith that the partners will each do their job and will be there to back each other up.

Firefighters learn the strengths and weaknesses of one another whilst working and socializing together and demonstrate a communal sense of cooperation and respect. They

take intentional action to enhance the personal and collective capacity of their fellow colleagues and respond to and influence the course of social and economic change. In times of crisis, firefighters find an immediate bond and pull together to survive and to support one another Surviving together is thus important for survivorship and thriving. Pratti *et al.* (2011: 3) confirm the importance of teamwork in firefighting by declaring that emergency rescue work, due to its characteristics, requires them to work collaboratively and in a coordinated way as a group. They further state that no first responder can be effective if working alone.

Recovery from disaster is inherently social and restoring or creating networks of social support is essential in dealing with the extreme stresses created by disaster. Ehrenreich (2001:53) refers to studies that find that social support has emerged as a reliable predictor of numerous psychological and health outcomes. Research (Cohen & Wills 1985) shows that individuals with high levels of social support, display better general well-being and appear to be "buffered" against stressful life events. These findings are supported by Brissette, Scheier and Carver (2002) who state that individuals who perceive themselves as having social support are optimistic and feel better able to cope with stress. Ehrenreich (2001:14) finds that the availability of social support networks such as supportive families, friends and communities reduce the likelihood of lasting adverse effects. The same author confirms that people who successfully coped with trauma in the past may withstand subsequent disasters better.

Emotionally focussed coping, emotional support and social support satisfaction are associated with growth of an individual. In times of disasters firefighters are able to establish their own milieu involving solidarity, togetherness and reciprocity through social support. From the aforementioned it can be concluded that social support is a strength that serves as a protective factor. This support may be needed for some time until individuals feel reconnected to others, and are able to transform their lives.

- **Connectedness at work.**

Shared history, values, cultural traditions, religion, knowing everybody and community trust are found to be what binds communities together. Own observation reflects that firefighters are indeed a community as they maintain a sense of family, often referred to as the

brotherhood of firefighters. Firefighters traditionally commence their shift with roll call where they present themselves as clean-shaven people in uniform. Having worked together for a number of years firefighters know all their peers, and by nature of their job must trust one another.

Connectedness amongst the airport firefighters can thus be seen as a strength which contributes to coping and survival. Ehrenreich (2001:37) holds the view that hard work and helping others provide a source of self-worth whilst Murphy *et al.* (2002: 312) confirm that the workplace is an important social environment that influences health behaviour by its norms, policies and job characteristics. Professional firefighters have been identified as an occupational group with a relatively unique work and social environment. Firefighters, in compliance with policy and procedures, are increasingly committed to workplace health and well-being and follow practices that promote resilience; not only for themselves, but also for those they help in times of disasters.

Not every airport firefighter at King Shaka International Airport, after response to an aviation disaster, will react in the same way. How resilient these firefighters are is dependent on the protective factors outlined in this study. The emotional effects of an aviation disaster will be mitigated by the acknowledgement of a need for emotional support, and the development of a plan with a corresponding policy to deal with emotional needs. Senior management support for aerodrome rescue firefighters, whilst engaging in fire and rescue activities as well as post incident, must be provided in order to increase the potential of the airport remaining open for business. It will decrease the potential for staff turnover and limit the risk of firefighters developing post traumatic stress disorder. The fortification of teamwork or group resiliency in the workplace pre- and post-event must thus be encouraged.

The concept of resilience involves the elements of risk being mitigated by protective factors to produce a positive or healthy outcome (Stewart *et al.* 1999:33). Protective factors help individuals to resist risk and contribute to resiliency (Greene & Conrad 2001:34) by buffering, interrupting or even preventing risk. Greene & Conrad (2002: 34) hold the view that protective factors can be classified as internal and external and that they “help people to

resist risk". Characteristics of protective factors include personal disposition, supportive family and extra- familial social environment.

2.4.3.1 Protective factors within teams

Research findings of Silberberg (2001: 54) identify communication, togetherness, sharing activities, affection, support, acceptance and commitment as strengths, which serve as protective factors within teams/families. Twenty-six years of experience in professional fire and rescue services, enhance the author's perception that all seven of these strengths will protect firefighters when exposed to potentially traumatic events. A brief description of these strengths will now be given:

- **Communication**

  Communication is a strength when the family interacts with each other frequently and predominantly in an open, positive, honest manner. Humour is considered as a strength.

- **Togetherness**

  Togetherness bonds the family and gives the family members a sense of belonging. Sharing similar values, beliefs and morals serves as a bond in families.

- **Sharing activities**

  Strong families share activities such as sports, camping, playing games and socialising with each other.

- **Affection**

  Affection is a strength when a family shows love, care, concern and interest for each other on a regular basis through words, hugs and thoughtfulness.

- **Support**

  Support is assisting, encouraging, reassuring each other and looking out for each other. It is a strength when family members feel equally comfortable to offer or ask for support. Local support serves as a source of support. In order to effectively deal with the consequences of an aircraft disaster, various disciplines are required,

including Airport Fire and Rescue, Emergency Medical Rescue Services (EMRS), security services such as the South African Police services (SAPS) and the South African National Defence Force (SANDF).

- **Acceptance**

  Showing respect, appreciation, and understanding for each other's individuality and uniqueness is a strength when family members acknowledge, value and tolerate each other's differences, and when the members allow each other space.

- **Commitment**

  Showing dedication and loyalty toward the family as a whole is a strength. Strong families often view the well-being of the family as a first priority. Varvel *et al.* (2007: 459) believe the job requirement of firefighters is to trust each other with their lives, which confirms their commitment to each other.

2.5 RISK FACTORS AFFECTING RESILIENCE OF FIREFIGHTERS

The media coverage of the events of 9/11 brought attention to the dangers that firefighters face while on the job. The first and subsequent arriving rescue crews were exposed to several fires, spilt fuel, severely injured and dying persons, confused crowds, survivors and dead bodies. Clearly, airport firefighters at King Shaka International Airport, upon arrival at an aircraft disaster scene, might encounter multiple stressful situations and potentially traumatic events. Furthermore Raphael and Newman (2000:16) list the following stressors of firefighters that may occur at the impact phase of aircraft accidents:

- Threat to life and encounter with death.
- Feelings of helplessness and powerlessness.
- Loss (for example human life, property and possessions).
- Dislocation (namely separation from loved ones, home, familiar settings, neighbourhood and community).
- Feeling responsible (for example feeling as though could have "done more").

- Inescapable horror (for example being trapped, being tortured).
- Human malevolence (particularly difficult to cope with − disaster as the result of deliberate human actions).

In order to contextualise the points listed above, an actual aircraft accident, as reported by McCarroll *et al.* (1992) is reflected upon.

On 19 July 1989, a United Airlines Flight 232 crashed at Sioux City, Iowa in the USA. A total of 296 passengers were on board, of which 174 survived. Airport firefighters were the first to arrive on scene and established triage and medical treatment areas. Thereafter survivors requiring medical attention were stabilised before being transported to hospitals. Over several days they removed the dead from the wreckage, searches for pieces of aircraft wreckage, bodies and body parts were conducted, and assistance given with the identification and autopsies of the bodies. The firefighters' primary function was to extinguish the fires, but while doing so many encountered survivors calling for assistance for themselves or for help in locating others. It is reported that many firefighters wondered afterwards if they had done the right thing at the time, and stated that sights such as an exposed hand with a wedding ring was found to be distressing.

Distressing emotional responses are common among rescue workers (Ehrenreich 2001:33). Reference is made to an air crash wherein more than eighty per cent of the rescue workers who had to deal with the bodies of victims showed some post traumatic symptoms. It is noted that two years after this air crash, a fifth of the rescue workers were still symptomatic. In line with the strengths perspective used for this study, it must be emphasised that presented with traumatic symptoms does not mean that firefighters, after exposure to the gruesomeness of aircraft disasters, will be rendered less effective. Research has shown that even the most resilient individual might still experience some form of distress, but will bounce back, and might even show positive growth after the exposure.

In various studies firefighters working with victims, have been found to be at risk of post-traumatic stress symptoms, post-traumatic stress disorder (PTSD) and other emotional disorders Tucker *et al.* (2002: 469). They identified three risk factors of PTSD namely female gender,

degree of physical exposure to trauma and prior trauma experienced. These three risk factors are not exhaustive. Ehrenreich (2001) adds severity of the disaster, cause of the disaster, demographics, stigmatisation and age as risk factors. These risk factors will be further explored and discussed.

2.5.1 Perception of firefighters

According to Jeanette and Scoboria (2008: 316) firefighters and society share a belief that firefighters are there to protect society, and that failure to do so would challenge this belief. They further state that not only individuals may be affected by the event, but emergency teams might also collectively experience events as traumatic when individuals within these teams are affected. This assertion supports a finding by Ehrenreich (2001:33) who asserts that firefighters' professional identity may depend on a perception of themselves as strong and resilient. Allowing themselves to experience the psychosocial effects of disasters to which they are exposed may challenge their self-respect or make them feel like they are letting their peers down or risking ridicule. Corrigan (2004:614) further holds the view that, due to stigma, people who would benefit from mental health services might choose not to pursue them in order to avoid the label of mental illness. Stigma diminishes self-esteem and robs people of social opportunities.

Owing to the fact that airport firefighters when called upon to respond to aircraft disasters, are expected to function as a team. Risk factors that might contribute to their vulnerability will be explored so that recommendations can be identified to mitigate the risk factors and enhance their resilience.

2.5.2 Prior exposure

Prior exposure to trauma is a risk factor for chronic PTSD resultant from adult exposure to trauma (King *et al.* 1999: 164). Years later, Joseph and Linley (2008:3) confirm that exposure to stressful and traumatic events can have severe and chronic psychological consequences, which often result in suffering. Similarly Dougall *et al.* (2000: 290) assert that exposure to a traumatic event may result in psychological consequences, and that some individuals will be more resilient than others. However, it must be noted that exposure to trauma, however

severe, is a necessary but not sufficient condition for the emergence of chronic post-traumatic difficulties (Litz (2002: 2002).

Prior exposure can also be non-work related. Professional rescue workers may have been exposed to many previous traumatic situations. The new experiences may activate unresolved feelings from past traumatic events. It is, however, not clear whether a history of trauma increases or reduces post-traumatic stress as studies have reported both outcomes (Dougall *et al*. 2000:290). These authors refer to findings that exposure to stressors that resemble each other may inoculate people and reduce the impact of these stressors. However, exposure to different types of traumas may be harmful although further studies, in contrast, suggest that prior trauma exposure is beneficial as it fortifies the individual to future stressful events.

The positive versus negative effect of prior exposure to potentially traumatic events, although inconclusive, is considered relevant to this study as Corneil *et al.* (1999: 131) confirm that isolated and repeated exposures to traumatic incidents have the potential to elicit post-traumatic reactions. Important to the objectives of this study, the same authors emphasize the fact that not all emergency workers or firefighters exposed to a traumatic event or a series of traumatic incidents develop PTSD (Corneil *et al*. 1999: 131).

In line with the above assertions, it is acknowledged that exposure to stressful and traumatic events can have severe and chronic psychological consequences, with potential to result in suffering (Joseph & Linley 2008:3). However, a growing body of evidence testifies to the fact that exposure to potential traumatic events can result in positive outcomes. This assertion will be further explored and discussed at the end of this chapter under Post-traumatic Growth after exposure to potentially traumatic events.

2.5.3 Career choice

Professional firefighting is acknowledged to be among the most dangerous and stressful of occupations (Corneil *et al.* (1999: 131). This finding is supported by Jeanette and Scoboria (2008: 314) who assert that being a firefighter is indisputably a stressful occupation.

Firefighters, including those employed at King Shaka International Airport, in addition to their training as firefighters, are also trained to deal with all types of medical emergencies. Whilst on duty, they must respond to potentially stressful emergency exposures including a variety of medical emergencies, hazardous material spills, explosions, fires and aircraft crashes.

These stresses include being on duty for long and unusual hours which can be disruptive to them and their families' lives. In addition to these stressors, extinguishing fires often poses a threat to life and limb. At aircraft disaster scenes, these firefighters may experience scenes of tragedy, destruction and horror that most people might never see in their lives. The stressful nature of being professional firefighters is acknowledged in countries as far afield as the U.S.A (Beaton &Murphy, 1995); the U.K (Paton, Ramsey & Sinclair 1995); Japan (Paton & Smith, 1995); Australia (Paton *et al.* 1995) and Canada (Corneil 1995).

As asserted by Mitchell and Everly (1995:268) some individuals are at a higher risk of experiencing PTSD by virtue of their career choice and further declare that careers in the emergency services professions (firefighters, law enforcement, emergency medical services and disaster responders) are examples of occupations that put their constituents at high risk for post-traumatic stress. Shakespeare-Finch, Smith and Obst (2002:275) also allude to this fact by declaring that *"[o]wing to the nature of their work, emergency service personnel are particularly vulnerable to the deleterious effects of work stress and trauma".*

Ehrenreich (2001:43) identifies the mental health of the rescue workers in the very early stages of disaster response as the highest priority, and substantiates this statement by concluding that their well-being is essential in enabling them to continue their rescue work, as their continued effective functioning is essential.

According to Oosthuizen (2004:1) helping in unusually tragic events may produce symptoms of stress. The potential of being negatively affected by exposure to traumatic events is not new as Mitchell and Dynegrow (1993:905) refer to a word of caution extended to emergency workers as far back as 1954 which reads:

> *You will naturally extend yourself to the limits of capacities. Do not push yourself beyond those limits, lest you become ill as those who need your help. Your training should prepare you to handle your own emotional problems first… the training you received as a disaster worker will in itself protect you somewhat in time of stress.*

This statement contributes to the faulty concept that training alone is sufficient to eliminate significant stress reactions in those who are exposed to horrible sights and sounds as they work with human pain, as can be expected when dealing with aircraft accidents.

Emergency personnel are subjected to stressors which can produce an array of psychological, social and physical reactions that may be extremely stressful (Mitchell & Dyregrow 1993:905). This assertion contradicts the perception that emergency personnel is trained not to react to human carnage and destruction or the pain of the survivors, as they were considered exempt from the psychological trauma which befell the victims and survivors (Mitchell & Dyregrow 1993:905). This contention is supported by Ehrenreich (2001:11) who states that it is not only those who directly experience the disaster (primary victims) who feel its emotional effects. Firefighters fall in the category of "secondary victims", who seek to rescue the primary victims and may also experience serious emotional effects.

Disaster workers involved in rescue efforts immediately following the disaster are at very high risk of adverse emotional effects (Ehrenreich 2001:32). In addition to post-traumatic responses like those of the primary victims of the disaster, rescue workers may experience anger, rage, despair, feelings of powerlessness, guilt or terror. These feelings may be distressing and make the firefighters feel that there is something wrong with them. Rescue workers, including firefighters, are at risk for adverse emotional responses, and a high priority for intervention (Ehrenreich 2001:62). Their needs are often ignored, since their training and willingness to work make it appear as if they have more emotional resources than the direct victims of the disaster. Their needs may be seen as "less important" than those of the primary disaster victims, and they themselves are often poorly prepared for their own emotional reactions to their experiences.

By own observation firefighters potentially experience trauma on a daily basis. This can be vicarious trauma, caused by exposure to serious injury or death or personal trauma experienced in the execution of their duties. It is generally accepted that firefighters become

hardy due to exposure to trauma, but certain scenarios are still difficult for them to cope with because of their unexpected, extraordinary nature. Firefighters are also confronted by dangerous scenarios, where they must not only protect themselves and their colleagues, but also place their own lives at risk to rescue people. Therefore hardiness, self-enhancement, repressive coping, positive emotion and laughter are pathways that lead to resilient firefighters. They make them more confident and able to minimise the amount of distress they might feel because they view potentially threatening situations as less stressful (Bonanno, 2004:25-26).

2.5.4 Exposure to death.

The sight of dead bodies and grotesque human remains can be overwhelming. Even experienced emergency services personnel can be traumatised by the sight of many dead bodies (Fullerton, Ursano & Wang 2004: 1370). The same authors also find that exposure to traumatic death resultant from a disaster, is associated with acute and chronic post-traumatic stress disorder. This finding supports that of Regehr, Goldberg and Hughes (2002: 505) who assert that emergency workers will be affected by an event involving mass casualties.

2.5.5 Frustration at being unable to fulfil disaster roles.

As mentioned earlier, this finding is supported by Jeanette and Scoboria (2008: 316) who claim that emergency responders and society believe that firefighters are there to protect society, and that failure to do so may challenge this belief. The daily firefighter rosters at King Shaka International Airport reveal that a maximum of 16 firefighters will be on duty at any given time. These 16 airport firefighters will be the first rescue personnel arriving if a commercial aircraft should crash on airport.

2.5.6 Physical exhaustion

By own observation extreme fatigue and physical exhaustion are often present among rescue workers after dealing with mass casualty events. As discussed in 3.6.1 above, 16 firefighters having to rescue passengers from burning wreckage requires them to deploy several lengths of fire hose, handle hydraulic and other rescue equipment, pitch ladders and carry survivors

and the dead and injured on stretchers. This will be physically exhaustive. In addition, airport firefighters might have to perform their duties in hostile and toxic environments as survivors might be hostile towards the cockpit and/or cabin crews for being responsible for the disaster.

Ruptured fuel tanks will also contaminate the environment; increase the risk of fire and the potential for firefighters slipping in fuel. Firefighters are often the first responders in catastrophic circumstances and therefore are witnesses to the gruesomeness of disasters and must provide help for others who are undergoing threats to life and limb. All these sources of stress accumulate into a characterisation of the firefighting profession as requiring not only the specific knowledge and skills, but also the courage to face stressful circumstances and perform the requisite tasks as well (Maddi *et al.* 2002: 3).

2.5.7 Level of exposure

Studies of fire and emergency services (Graham 1981; Mitchell 1983/1991; Raphael & Singh 1983; Robinson 1988) have raised the possibility that involvement in helping in unusually traumatic events may produce symptoms of stress. Exposure to stressful and traumatic events can have severe and chronic psychological consequences (Joseph & Linley 2008:3). This statement supports previous researchers who find that the potential harmful effects of exposure to unusually traumatic events as an element of working in hazardous-duty occupations. Ehrenreich (2001:13) holds the view that the more severe the disaster and the more terrifying or extreme the experiences of the individual, the greater the likelihood of widespread and lasting psychological effects.

2.5.8 Lack of preparation risk factor

According to Ehrenreich (2001:33) rescue workers are rarely mentally prepared ahead of time either for their own reactions or to deal with the reactions of primary victims. Disaster workers, including firefighters, face additional stress when they complete their tasks and return home, to their “regular” life. Their experience has diverged in a variety ways from the experience of their families and in the absence of preparation of workers and their families, a variety of marital and parent-child conflicts and stresses may appear.

Lack of provision of psychosocial assistance to these rescue workers may result in their inability to function efficiently or them being unable to help others. Furthermore, the South African Disaster Management Act (South Africa 2002) requires organs of state and other institutions involved in disaster management, as emergency preparedness, to mobilise, organise, and provide relief measures to deal with an impending or current disaster or the effects of a disaster.

Internationally, the International Civil Aviation Organisation (ICAO) regulates aviation preparedness by the requirement that full-scale emergency exercises must be held at least biannually. In South Africa, the South African Civil Aviation Authority (SACAA) ensures compliance to this requirement by enforcing the biannual full-scale exercise and a partial/desktop exercise to be conducted in the years between the full-scale exercises. It is of concern that the South African Disaster Management Act, The International Civil Aviation Organisation as well as the South African Civil Aviation Authority do not acknowledge nor regulate the requirement for psychological preparedness of emergency workers including firefighters. The importance of preparedness is referred to by Bishop *et al.* (2006:101) who states that the preparedness of an organisation may be correlated with how resilient individuals and the entire workplace are after workplace trauma.

2.5.9 Cause of the disaster

As stated by Ehreneich (2001:13), some types of disaster may be more likely to produce adverse effects than others. The same author is of the opinion that the psychological consequences of disasters which are intentionally inflicted such as assaults, terrorist attacks and war, are likely to be greater than those disasters which may have been produced by human activities but which are unintentional, for example airplane crashes and industrial accidents. Statistics reveal that the most prominent cause of aircraft crashes is human activity, whether intentional or unintentional. From this it can be concluded that the psychological consequences associated with aircraft crashes will be severe.

2.6 TYPICAL RESPONSES TO POTENTIALLY TRAUMATIC EVENTS

People respond differently when exposed to potentially traumatic events. When exposed to potentially traumatic events such as aircraft disasters aerodrome rescue firefighters will either respond negatively or positively.

2.6.1 Negative responses

Research findings show that Tedeschi and Calhoun (2004: 2) allude to the fact that persons exposed to potentially traumatic events typically display negative responses, which are common in humans. However, they also caution that although the responses might be common, it is not universal.

In response to sudden, unexpected events, initial reactions of disbelief, psychological numbness and dysfunctional patterns of thinking are common, whilst human beings who perceive their physical well-being is threatened, will typically display anxiety and fear. Tedeschi and Calhoun (2004: 2) further state that, depending on the intensity, severity and duration of the physical threat or suffering, whether direct or vicarious, the anxiety can persist for a long time after the actual threat has been removed.

Further psychological symptoms include sadness, depression, guilt and anger. Symptoms of unpleasant physical reactions include fatigue, muscle tension and aches, gastric symptoms and general discomfort. A potential risk of developing psychiatric problems is also a reality. Understanding and anticipating the above-mentioned potential symptoms of negative responses to potentially traumatic events will enable Fire and Rescue management to identify firefighters that might require priority support in order to minimise the risk of post-traumatic problems.

2.6.2 Positive responses

The fact that exposure to trauma can have positive outcomes is alluded to by Calhoun and Tedeschi (2004: 93) whose research findings state that highly meaningful outcomes can result from exposure to trauma. They substantiate their findings by confirming that research

data indicate that a substantial proportion of trauma survivors report at least one positive change arising from their struggle with trauma. Positive responses might also result in positive growth.

2.7 POST-TRAUMATIC GROWTH

This chapter commenced with a description of a typical psychological and physical profile of airport firefighters and progressed to a policy and legislative framework description before the strengths that serve as protective factors were explored and discussed. Finally the risk factors inherent to being a firefighter were discussed. Before the chapter can be concluded, it is imperative to note that exposure to potentially traumatic events does not necessarily result in negative consequences. The exposure can have the opposite outcome, and result in positive growth. This assertion will now be further explored and discussed.

Post-traumatic growth (PTG) is defined by Tedeschi and Calhoun (2004: 1) as "*the experience of positive change that occurs as a result of the struggle with highly challenging life crisis.* They further state that post-traumatic growth is manifested in a variety of ways, including an increased appreciation for life in general, more meaningful interpersonal relationships, an increased sense of personal strength, changed priorities and a richer existential and spiritual life. These symptoms of post-traumatic growth are given meaning by the following statement, made by a survivor of an aircraft crash in which 83 people died, and sited by Shearer (2001: 64), *"When I got home, the sky was brighter, I paid attention to the texture of sidewalks. It was like being in a movie... [Now] everything is a gift".*

Tedeschi and Calhoun (2004: 4) explain that post-traumatic growth describes the experience of individuals, who after experiencing traumatic events, not only survived the traumatic experience, but developed to a level higher than status quo before the exposure. This assertion is considered important with reference to firefighters who must, as soon as possible after attendance at rescue scenes, be available for the next call.

Although the main focus of this section of the chapter is on the possibility of positive change arising from the exposure to potentially traumatic events, it is appropriate to also acknowledge that this exposure can produce psychological distress. In doing so, the reader is made aware

that the researcher recognises that traumatic events are not viewed simply as precursors to growth.

A review of literature on post-traumatic growth indicates that reports of growth experienced in the aftermath of traumatic events outnumber reports of psychiatric disorders, even in cases of truly traumatic rather than everyday traumas (Tedeschi & Calhoun 2004: 2). These authors again caution that the assumptions that exposure to trauma will result in disorder, should not be replaced with expectations that growth is an inevitable result, and assert that distress and growth often coexist.

2.7.1 History of post-traumatic growth

The general understanding that suffering and distress can be potential sources of positive change is thousands of years old (Prati & Pietrantoni 2009: 364; Shaw *et al*. 2005:2; Tedeschi & Calhoun 2004: 2). Tedeschi and Calhoun (2004: 2) substantiate this assertion by giving examples confirming that some of the early ideas and writings of the ancient Hebrews, Greeks and early Christians, as well as some of the teaching of Hinduism, Buddhism and Islam relate to the potentially transformative power of suffering. In addition to the above findings, Tedeschi and Calhoun (2004:2) confirm that a major theme of Christian traditions is the narratives about the transformative effect of the execution of Jesus, whose suffering is viewed as having the power to transform others.

2.8 INTERVENTIONS

Prior, during and after exposure to the gruesomeness of aircraft disasters, follow-up and specialised counselling may be required for the rescue workers, especially the first responders who arrive first on scene, and have to “stabilise” a chaotic situation. Departmental support is very important in this process as firefighters may fear they will be regarded as inadequate if they seek assistance.

Following a particular stressful rescue event, organisational response measures based on the available literature on individual and group coping strategies for these groups must be implemented. Many of these measures are applicable proactively, that is, as part of training

before a disaster or critical incident occurs, as a means of preparation (Miller 1995: 592). Furthermore Slawinski (2005:82-83) lists eight assumptions which should be borne in mind when supporting traumatized persons:

1. In a crisis event, each individual's response is unique. In line with this assertion, Saleebey (1997: 49) states that in order to survive, people employ their will, their vision and their skill.
2. Each individual is the expert in his or her own recovery process. In support of this finding, Saleebey (2002: 14) confirms that every person possesses assets, resources, wisdom and knowledge which should be utilized in their misfortune, and further states that individuals almost always know what is right for them.
3. The natural recovery process needs to occur without artificial interventions disrupting the process.
4. The helping process should be individualized. In helping firefighters deal with the consequences of exposure to traumatic events, it must be noted that human beings possess the strengths and potential to resolve their own difficult situations (Cowder & Sniley 2002: 107).
5. The role of mental health professionals is to facilitate the individual's ability to tap into established strengths developed over a lifetime and to encourage application to current reactions.
6. Support and resources are offered to the individual to be used at their discretion. In addition, each person is responsible for his/her own recovery with the individual being the director of the helping efforts (Kisthardt 2002: 163).
7. Individuals should be provided with a means of self-evaluation in order to assess the need for future resources or support.
8. A strength-based approach is culturally sensitive, and can be readily adapted for use with many cultures.

2.8.1 Critical incident stress debriefing

Critical incident stress debriefing (CISD) or other forms of debriefing have gained acceptance among field emergency workers. However, there is no evidence that such interventions will prevent psychological problems, and they may have a negative impact on some. It must be

noted that research found that CISD will not be appropriate for everyone, and should never be mandatory. Having been exposed to CISD during 27 years of firefighting experience, the researcher holds the view that it should be offered to firefighters after exposure to the gruesomeness of aircraft disasters as it provides an opportunity for employers to show tangible support following critical incidents as corroborated by Gist (2002: 278). In addition no evidence could be found that CISD caused any harm to individuals.

2.9 SUMMARY

People are exposed to potentially traumatic events at least once during their lifetimes. However, they possess the ability to overcome adversity to lead healthy and successful lives due to their resilience. Focusing on protective factors that protect from harm and promote healthy and successful lives after exposure to adversity, instead of focus on adversity is the implemented approach. Using strengths-based approach as a "resilience-lens", the concept of resilience is explored in an ecological system comprising the individual, his/her family and place of work.

Firefighting is accepted as one of the most dangerous and stressful occupations. Research findings confirm that the worldwide air transportation of passengers is growing, with a subsequent potential increase of aviation disasters occurring. Therefore aerodrome rescue firefighters must be protected before harmful stress reactions affect job performance, careers, families and health.

CHAPTER 3

POLICY AND LEGISLATIVE FRAMEWORKS FOR AVIATION RISK REDUCTION

3.1 BACKGROUND

South Africa has an excellent record in aviation safety with records indicating that no aviation disasters ever occurred on South African soil. Such a record is not merely a matter of luck; it is viewed as the result of a combination of factors in the human, operational and natural environments. However, the clean sheet for aviation disasters to date is no guarantee of future success in the aviation industry. The importance of protecting aerodrome rescue firefighters, as first responders to aviation disasters by enhancing their resiliency can therefore not be over emphasised.

Aviation disasters are classified as technical disasters, which can cause extensive damage to human life and the natural environment. These disasters can also inflict large financial or reputational losses on companies, and may even threaten their survival (Siomkos 2000: 101). An example of this is given by Lai and Lu (2005: 455) who confirm that after September 9/11, airlines in the US suffered revenue loss and struggled to maintain financial solvency. While USAir and United Airlines filed for bankruptcy, two other large airlines, namely American Airlines and Continental Airlines reported financial difficulty. The significance of aerodrome rescue firefighter preparedness is focussed on, as vulnerability of these firefighters can contribute to some of the above-mentioned losses.

Coppola (2006: 209) defines disaster preparedness as "*actions taken in advance of a disaster to ensure adequate response to its impacts, and the relief and recovery from its consequences"*. Slepski (2007: 426) expands on this definition by defining emergency preparedness as

> *The comprehensive knowledge, skills, abilities and actions needed to prepare for and respond to threatened, actual or suspected chemical, biological, radiological, nuclear or explosive incidents, man-made incidents, natural disasters or other related events.*

Slepski (2007: 426) then argues that although annually billions are spent worldwide on disaster preparedness, preparation of emergency responders is neglected.

This chapter commences with providing a job analysis of firefighters, followed by an exploration and description of the policy and legislative framework in which they perform their functions before aerodrome rescue. Firefighting is conceptualised within a disaster management model. The chapter concludes with an identification of the risk factors associated with airport firefighting before the protective factors of these firefighters are explored and described.

3.2 JOB ANALYSIS FOR AIRPORT FIREFIGHTERS

In practice it is observed that fighting aircraft fires following an accident is only one part of an aerodrome rescue firefighter's (ARFF) job. ARFF also fights fires within the airport terminals and attends to medical emergencies. In addition, ARFF attends to events such as firebreaks, which if left unattended, have the potential to develop further.

A job analysis for airport firefighters will promote a better understanding of the uniqueness of their tasks and function. In addition to saving lives, fighting fires and protecting property, airport firefighters daily spend hours training and planning for their job. They train to familiarise themselves with their equipment and its capabilities as well as to prepare for any situation, and to develop a sense of teamwork. Hours are spent enhancing skills such as rescue techniques. By necessity, airports store large amounts of hazardous materials, such as jet fuels and other flammable products. These hazardous materials can burn at extremely high temperatures, and some may react to water, so simply spraying water is not sufficient for all fires. Airport firefighters must also be concerned with the environmental impact of the chemicals stored at airports. Should a spill or leak occur, airport firefighters must know how to properly contain and control those chemicals.

3.3 POLICY AND LEGISLATIVE FRAMEWORK

The principal objective of an airport rescue and firefighting service is to save lives and the most important factors determining the outcome on effective rescue in a survivable aircraft accident are:

(1) The training firefighters received.
(2) The effectiveness of the equipment.
(3) The speed with which personnel and equipment designated for rescue and firefighting purposes can be put into use (Annex 14-Aerodromes 9.2).

The principal objective of airport firefighters, namely to save lives in aviation disasters, is regulated at an international, national and local level.

3.3.1 International regulations

At an international level the International Civil Aviation Organisation (ICAO) governs civil aviation safety by issuing international standards and recommended practices. On 1 March 1947, South Africa became a member of the Chicago Convention on International Civil Aviation, and thus agreed to comply within its boundaries to the set out recommendations as contained in the Airport Rescue and Firefighting Manual of Procedure – SACAA R&FFS. The legislative requirements for airport rescue and firefighting services are in accordance with the Civil Aviation regulations as well as with technical standards. The aforementioned regulations and technical standards make the ICAO documents applicable. In order to establish and maintain a safety culture within the Civil Aviation Industry, it is imperative that the ICAO standards be implemented.

Civil Aviation Regulations stipulate the minimum requirements with regards to Airport Rescue and Firefighting Services. Globally aerodromes are categorised in categories ranging from Cat 1 being the lowest category and Cat 10 being the highest category. The King Shaka International Airport is licensed as a Category 9 airport, but designed and built to Cat 10 specifications to accommodate the Airbus 380, which is currently the largest passenger carrying aircraft. The implications for aerodrome rescue and firefighters is that the biggest commercial aircraft in the world, the Airbus 380, which carries more than 400 passengers can

land at this airport. Should this type of aircraft crash at this airport, the 16 aerodrome firefighters will be the first responders to the disaster.

The Convention on International Civil Aviation requires that all aerodromes open to public use and the jurisdiction of a Contracting State should provide uniform conditions for the aircraft of all other contracting states. In addition, each state is obliged to provide in its territory, airports and other air navigation facilities and services in accordance with the Standards and Recommended Practices (SARPs) developed by ICAO. It contains SARPs on the subject of aerodrome design and operation and provides guidelines for Aerodrome Rescue Firefighter (ARFF) standards and services.

The main objective of rescue and firefighting services is to save lives. This annex also recognises that the provision of rescue and firefighting services is particularly important for accidents occurring at or in the immediate vicinity of an airport as this. Here the opportunity for saving lives is greatest and stipulates that there are a number of factors that will influence the outcome of rescue and firefighting operations, including (1) the training received by ARFF personnel, (2) the effectiveness of the equipment in use and (3) the speed at which the equipment and personnel can be put in use.

3.3.2 National regulations

Nationally the South African Civil Aviation Authority, by means of the Airport Rescue and Firefighting Manual of Procedure (SACAA F & RFFS: date) informs the aerodrome operator, the Airports Company South Africa (ACSA) in this instance, with regards to the minimum requirements expected to be met by the aerodrome operators in South Africa. The legislative requirements are in accordance with the Civil Aviation Regulations as contained in the SA-CATS-AH. The aforementioned regulations and technical standards make the ICAO documents applicable. In addition, the civil Aviation Act (South Africa, 2009)) and the Disaster Management Act (South Africa, 2002) are considered the most relevant national legislation that govern aerodrome rescue and firefighting.

- **Civil Aviation Act**

  The Civil Aviation Act (South Africa 2009) governs the aviation industry in South Africa. In addition to stipulating the current civil aviation regulations, it also incorporates the Chicago Convention and the International Air Services Transit Agreement into South African domestic law. As mentioned above, South Africa became a member of ICAO, whose primary aims are to develop principles and techniques of international air navigation to ensure safety, in 1947 after ratification of the Chicago Convention of 1944 on 1 March 1947.

  As appointed agency under this act, the South African Civil Aviation Authority (SACAA) applies the standards as set by ICAO to be the minimum standards and to regulate these standards within the boundaries of South Africa. The Commissioner appoints CAA inspectors as authorised officers (South Africa 1962).

- **Disaster Management Act**

  The preamble to the Disaster Management Act, (South Africa, 2002)) provides for *"An integrated an co-ordinated disaster management policy that focuses on preventing or reducing the risk of disasters, mitigating the severity of disasters, emergency preparedness, rapid and effective response to disasters and post-disaster recovery*". Regular rehearsals (drills), as mandated by ICAO and enforced in South Africa by the SACAA, is giving effect to the requirement for an integrated and co-ordinated disaster response and will be discussed later in this chapter.

3.3.3 Local regulations

Aerodrome rescue and firefighting services at all nine airports owned by the Airports Company South Africa (ACSA) are regulated by policy and procedures located in the company's internal intranet. Since 1994, when the ACSA was formed, procedures were drafted and revised, detailing how the airport firefighter should perform. As of March 2011 a total of 30 ARFF approved procedures, some attached as Addendum K, are published on the company's intranet. However, not a single procedure exists detailing how to prepare airport

firefighters mentally for dealing with the gruesomeness of aircraft disasters resulting in multiple casualties.

From the preceding paragraphs it can be concluded that airport firefighters indeed perform their functions in a regulated environment. The following section will now place firefighter resilience in a disaster management model.

3.4 AERODROME RESCUE AND FIREFIGHTER RESILIENCE WITHIN DISASTER MANAGEMENT MODEL

In order to explore and describe the level of resilience of airport firefighters, risk is discussed in terms of vulnerability using the Pressure and Release (PAR) model of Wisner and his colleagues. Thereafter the model is reversed to present resilience instead of vulnerability. Wisner *et al.* (2004: 50) assert that a disaster occurs when a significant number of vulnerable people experience a hazard and suffer damage and/or disruption of their livelihood system in such a way that recovery is unlikely without external aid. For the purpose of this study, aviation disasters will be viewed as the hazard and the vulnerable people will refer to the airport firefighters that will be exposed to this hazard. External aid will encompass all the external agencies such as police, traffic and ambulance services that will be augmenting the fire and rescue service available at the airport.

The disaster Pressure and Release (PAR) model refers to a progression of vulnerability, in which root causes are shaped by a series of dynamic pressures which can give rise to unsafe conditions. These three forces are defined as follows:

- *Root causes* (or underlying causes) are a set of well-established, widespread economic, demographic and political processes that give rise to vulnerability (and reproduce vulnerability over time) and affect the allocation and distribution of resources between different groups of people (Wisner *et al.* 2004: 52-53).

- D*ynamic pressures* are the processes and activities that transform the effects of the root causes into vulnerability and channel the root causes into unsafe conditions (Wisner *et al.* 2004: 53).

- U*nsafe conditions* are the specific forms in which the vulnerability of a population manifests itself in time and space in conjunction with a hazard (Wisner *et al.* 2004: 55).

The pressure and release model consists of two components, namely:

(1) A progression to vulnerability.

(2) A progression to safety component.

3.4.1 A progression of vulnerability

In discussing the vulnerability of people using the progression of vulnerability, one has to identify the root causes. Thereafter the dynamic pressures which translate the root causes into unsafe conditions must be identified. The last section of the progression of vulnerability is the unsafe conditions which are specific forms in which vulnerability of a population is expressed in time and space in conjunction with a hazard.

Figure 2 depicts the progression of vulnerability in order to demonstrate how vulnerability can be expressed in relation to a risk, when confronted by a hazard. The focus of this study is on resilience and not vulnerability. The above statements will thus only be contextualized by means of a model (Figure 2) but will not be further explored or discussed. The Progression of Vulnerability concept will be followed by the Progression of Safety concept, which is more relevant to this study.

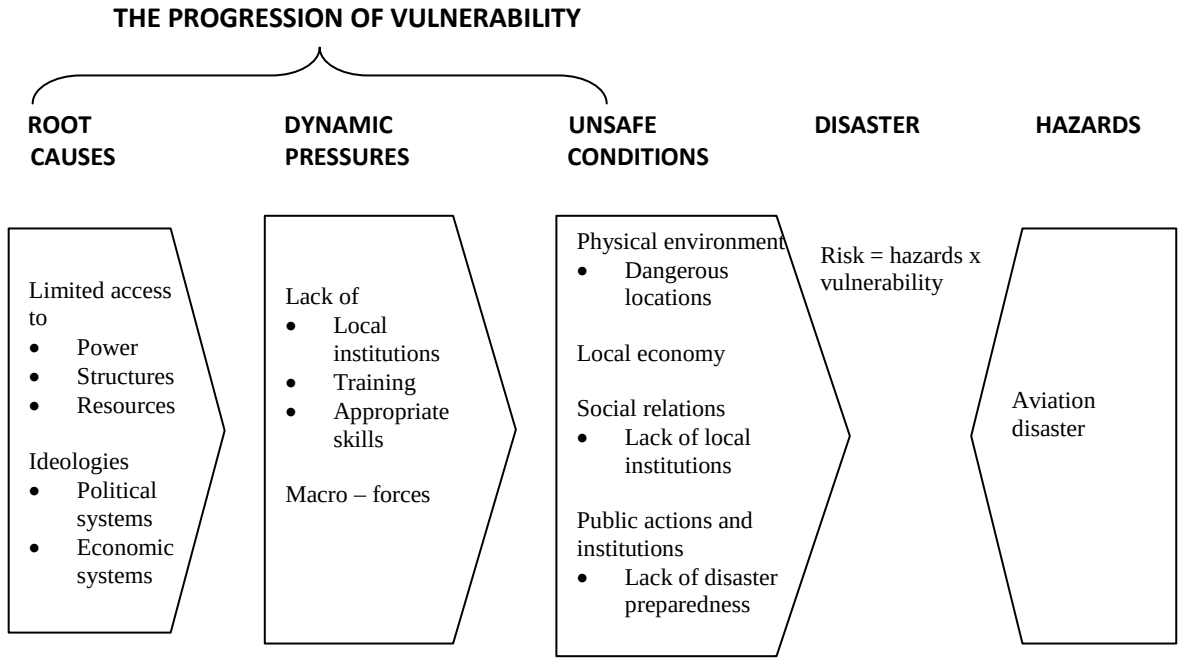

Figure 3.1: Pressure and Release (PAR) model: progression of vulnerability.*Source: Wisner et al. (2004: 51)*

Figure 3.1 demonstrates how root causes can lead to dynamic pressures, which results in unsafe conditions. When unsafe conditions exist and a hazard would occur, vulnerable people will be affected.

3.4.2 The Release Model: Progression to Safety

According to Ahern *et al.* (2006: 105) resilience represents the interaction between risk factors (vulnerability) and protective resources (protection). A similar relationship can be found in the Progression of Safety Model which is located in the "release" component of the Disaster Pressure and Release (PAR) model. Wisner *et al.* (2003: 330) conclude their risk and vulnerability analysis by identifying seven objectives of risk reduction, namely:

(1) Communicate understanding of vulnerability
(2) Analyse vulnerability
(3) Focus on reversing the PAR Model
(4) Emphasize sustainable development
(5) Improve livelihoods
(6) Add recovery
(7) Extend to culture (i.e. build a safety culture).

This section will focus on objective three; *focus on reversing the PAR Model*, by exploring enforced procedures which unintentionally reduce firefighter risks by addressing root causes, dynamic pressures and unsafe conditions.

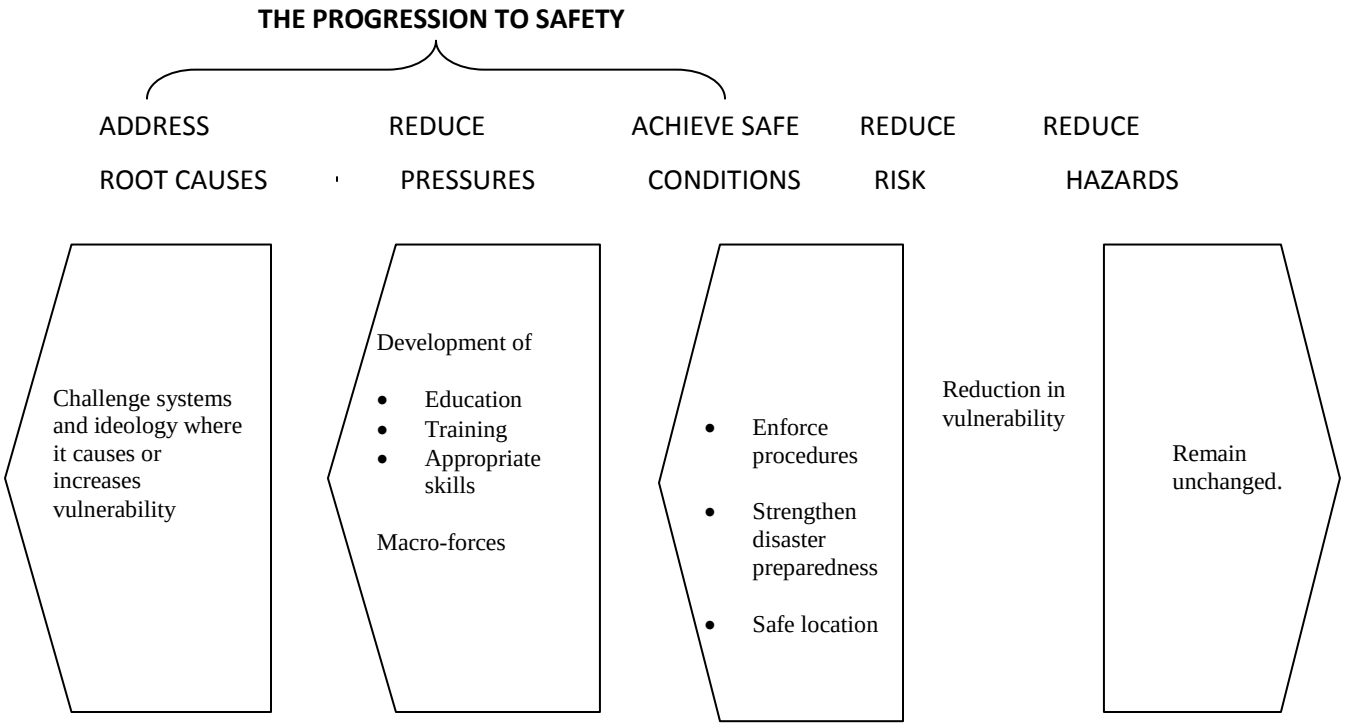

Figure 3.2: Progressions to Safety

Source: Wisner et al. (2004: 259)

To contextualise the Progression of Safety model (Figure 3.2), a discussion will now follow detailing how vulnerability can be converted to resilience, to satisfy the aims of this study. In order to achieve resilience, vulnerable people's access to resources can be improved, and changes in power relations can be made. Vulnerability can be decreased, and if aid is properly conceived and implemented, even the most vulnerable survivors can recover in such a way that future vulnerability is reduced (Wisner *et al.* 2004: 343).

The Release model is the reverse of the progression of vulnerability to a progression of safety. The release model is thus the opposite of the vulnerability model, where specific actions and initiatives taken will have a progressive effect on enhancing resiliency. In the release model the new outcome is "safe" as opposed to "unsafe" conditions, and resilience opposes vulnerable people (Wisner *et al.* 2004: 343). In order to achieve safe conditions, one has to (1) address the root causes and (2) reduce the dynamic pressures.

3.5 ADDRESSING ROOT CAUSES OF AIRCRAFT ACCIDENTS

As recorded by Janic (2000: 46) the root cause of aviation disasters originates in the maintenance workshops, and in the factories where aircraft components and systems are produced. Whilst McFadden and Towell (1999: 177) find the major causes of all aviation accidents to be pilot-error, and attribute approximately 75% of aviation accidents to this cause. Table 3.1 indicates that the major cause of aircraft accidents is pilot error.

TABLE 3.1: CAUSES OF FATAL ACCIDENTS BY DECADE (PERCENTAGE)

Cause	1950s	1960s	1970s	1980s	1990s	2000s	All
Pilot Error	40	32	24	25	27	26	29
Pilot Error (weather related)	11	18	14	17	21	17	16
Pilot Error (mechanically related)	7	5	4	2	4	3	5
Total Pilot Error	58	57	42	44	53	46	50
Other Human Error	0	8	9	6	8	8	6
Weather	16	10	13	15	9	9	12
Mechanical Failure	21	20	23	21	21	28	22
Sabotage	5	5	11	13	10	9	9
Other Cause	0	2	2	1	0	1	1

Source: Planecrashinfo.com

Further research (Janic 2000: 45-46; McFadden 1999: 177) produced the following as causes of fatal aircraft accidents:

- Human error combined with other factors which can be attributed to most aircraft accidents.
- Mid-air collisions, which are mainly caused by air traffic controller errors.
- Collisions of aircraft which are mostly associated with pilot error.
- Crew inexperience.
- Mechanical failures resulting from human errors made whilst constructing. Producing and maintaining equipment.
- Terrorist actions.
- Military operations.
- Maintenance, manufacturing and design flaws.
- Operational deficiencies.

Human errors can be reduced by training and the structuring of air traffic, but factors such as hazardous weather, mechanical faults, sabotage and military operations are more difficult to control (Janic 2000: 46-46). However, aerodrome rescue firefighters cannot control any of the above-mentioned causal factors of aircraft accidents. Therefore these factors will not be further discussed.

3.6 REDUCING DYNAMIC PRESSURES FOR SAFE AVIATION ENVIRONMENT

The dynamic pressures that translate root causes into unsafe conditions for specific people can be reversed. The pressure process leading to disaster is thereby reversed. Wisner *et al.* (2004: 51) list lack of social support, training, appropriate skills as factors that increase vulnerability. It is hypothesised that these factors, when not lacking, will enhance resilience. They will be further discussed because aerodrome rescue firefighting service at airports has control over the factors that can reduce dynamic pressures.

The ICAO, in an effort to enhance aviation safety, issues Standards and Recommended Practices (SARPs) which it promulgates through its 18 Annexes to the Chicago Convention. It provides guidance for ARFF standards and services. The following addresses the main SARPs of Annex 14.

3.6.1 Aerodrome categorisation.

The level of fire protection to be provided at an aerodrome depends on the category of the aerodrome. The guidelines for these categories are outlines in Table 3.2.

TABLE 3.2: AERODROME CATEGORISATION FOR RESCUE AND FIREFIGHTING

Aerodrome Category	Aircraft overall length	Maximum fuselage width
1	0m up to but not exceeding 9m	2m
2	9m up to but not exceeding 12m	2m
3	12m up to but not exceeding 18m	3m
4	18m up to but not exceeding 24m	4m
5	24m up to but not exceeding 28m	4m
6	28m up to but not exceeding 39m	5m
7	39m up to but not exceeding 49m	5m
8	49m up to but not exceeding 61m	7m
9	61m up to but not exceeding 76m	7m
10	76m up to but not exceeding 90m	8m

Source: ICAO (Doc 9137-AN/898)

3.6.2 Personnel

According to the International Civil Aviation Organisation:

> *All rescue and firefighting personnel shall be properly trained to perform their duties in an efficient manner and shall participate in live fire drills commensurate with the types of aircraft and type of rescue and firefighting equipment in use at the aerodrome, including pressure-fed fires.*

In addition to this recommendation, ICAO provides for the number and deployment of personnel as follows:

- ARFF vehicles should be staffed in such a way that they can be deployed immediately with enough staff to be fully operational.
- Vehicles should be staffed so as to ensure that they discharge principle and complimentary agent at maximum capability.
- The control room or any other facility for ARFF-related communications can continue to be operable until alternative arrangements are made under the airport emergency plan.

3.6.3 Extinguishing agents

The quantity of extinguishing agents shown in Table 3.3 are based on the amount of liquid that is required to create conditions next to the fuselage of an aircraft that are tolerable enough to allow for rescue of occupants, should there be an aircraft accident involving fire.

TABLE 3.3: MINIMUM USABLE AMOUNTS OF EXTINGUISHING AGENTS

Foam meeting performance Level A			**Foam meeting performance Level B**		**Complimentary agents**		
Aerodrome Category	Water (L)	Discharge rate for foam solution/min	Water (L)	Discharge rate for foam solution/min	Dry Chemical Powders (kg) or	Halons (kg) or	CO2 (kg)
4	3,600	2,600	2,400	1,800	135	135	270
5	8,100	4,500	5,400	3,000	180	180	360
6	11,800	6,000	7,900	4,000	225	225	450
7	18,200	7,900	12,100	5,300	225	225	450
8	27,300	10,800	18,200	7,200	450	450	900
9	36,400	13,500	24,300	9,000	450	450	900
10	48,200	16,600	32,300	11,200	450	450	900

Source: ICAO (Doc 9137-AN/898)

3.6.4 Response time

As indicated earlier, the speed at which rescue and firefighting operations is put into action is a critical aspect of increasing the survival rate of an aircraft accident. Accordingly, ICAO recommends a response time of two minutes, but not exceeding three minutes for reaching the end of the runway as well as any other part of the movement area. Response time is defined in Annex 14 as the time between the initial call to the aerodrome rescue and firefighting service (ARFFS) and the time when the first responding vehicle is in place to apply foam at a rate of at least 50% of the discharge rate specified in Table 3.3. Subsequent vehicles to be used in the rescue and firefighting operation should arrive no more than one minute after the first responding vehicle. However, it should be noted that the ICAO specifies that these recommended times must be achieved in optimum visibility and surface conditions.

3.6.5 Rescue equipment and vehicles

According to ICAO, the rescue equipment to be provided on the rescue and firefighting vehicles should be commensurate with the level of aircraft operations. A list of the equipment required may be found in Addendum J. Table 3.4 below outlines the minimum number of vehicles that should be provided at each aerodrome per category.

TABLE 3.4: REQUIRED NUMBER OF RESCUE AND FIREFIGHTING VEHICLES

Aerodrome category	Rescue and Firefighting Vehicles
1	1
2	1
3	1
4	1
5	1
6	2
7	2
8	3
9	3
10	3

Source: ICAO

King Shaka International Airport is licensed as a Category Nine airport which theoretically means that the personnel, equipment and speed at which the personnel and equipment can be

brought into operation are adequate to fight a fire involving a typical 525 seat (maximum 853) Airbus 380 aircraft with overall length of 72.72 metres.

3.7 ACHIEVING SAFE CONDITIONS

Addressing the root cause of aviation accidents is beyond the scope of ARFFS. Reducing dynamic pressures is a factor which can be controlled, but the factor with the most potential to be influenced by ARFFS is to achieve safe conditions for the aviation sector. Unsafe conditions are the specific forms in which vulnerability of a population is expressed in conjunction with a hazard. Achieving safe conditions will thus enhance resilience. In order to do so within a regulated aviation environment, in which airport firefighters perform their functions, inadvertently provides for a protected environment.

The most important factors to effective rescue attempt in a survivable aircraft crash are detailed in the relevant chapters of the ICAO 9137-AN/898 Part 1 and 7 as well as Doc 7192-AN/857. These chapters are alluded to below and are those contained in ICAO Doc 9137-AN/898 Part 1 (enacted in CARs 139.02.7) technical standards contained in SA-CATS-AN with the same reference numbers.

Annually the South African Civil Aviation Authority conducts audits on all licensed airports in South Africa to ensure aviation safety. Contravention of or non-compliance with the laid down standards might result in the airport operator's licence being suspended or revoked. The fact that flights are landing at, and departing from King Shaka International Airport, attests to the assertion that this airport maintains a safe environment for aviation.

SACAA, in order to maintain uniform standards in certification of airports so that safety of civil aviation can be ensured, annually audits the following provisions as contained in the memorandum of Procedures (MOP): Level of protection to be provided (Chapter Two); Airport facilities affecting rescue and firefighting services (Chapter Three); Communications and alarm requirements (Chapter Four); Factors in the specifications process for Rescue and Firefighting vehicles (Chapter Five); Protective clothing and respiratory equipment (Chapter Six); Ambulance and medical services (Chapter Seven); Extinguishing agent characteristics (Chapter Eight); Fire

stations (Chapter Nine); Personnel (Chapter Ten); Emergency organisations (Chapter Eleven); Airport firefighting and rescue procedures (Chapter Twelve); Rescue in difficult environments (Chapter Thirteen); Training (Chapter Fourteen); Foaming of runways for emergency landings (Chapter Fifteen); Aircraft refuelling practices (Chapter Sixteen); Availability of rescue and firefighting information (Chapter Seventeen).

In order to ensure a safe environment for the aviation industry, thus reducing the risk of potential aircraft accidents a number of company procedures, the aims and objectives, attached as Annexure K, are enforced at all ACSA operated airports in South Africa.

3.8 RISK AVIATION DISASTER KING SHAKA INTERNATIONAL AIRPORT

There have been numerous efforts within the air transport industry to reduce the likelihood of aircraft accidents occurring. New and improved technologies include the use of radar, the improvement of jet engines and navigational aids (Button *et al.* 2004: 252). Coupled with improved technology, operational policies and procedures at aerodromes also contribute to the safety within the aviation sector. Button *et al.* (2004: 252) contribute their findings, that air transportation in the 21st century is a remarkably safe means of transportation in most parts of the world, to the above-mentioned improvements.

However, empirical evidence suggests that more people are utilising air transportation for work and pleasure opportunities (Braithwaite 2001: 113). To cope with this demand, which contributes to the forecast of worldwide air traffic growth of between 4.8 and 5.2%, aircraft manufacturers are developing larger aircraft such as the Airbus 380 which carries more passengers than the Boeing 747 in size and capacity (Barros & Wirasinghe 2002: 121). Whilst society benefits from the growth in the air transport industry, there is a risk involved. ARFF, which Braithwaite (2001: 116) considers as a secondary safety measure, is concerned with mitigating the consequences of an aircraft accident rather than prevention.

McFadden and Towell (1999: 177) suggest that if the number of accidents is proportional to the number of flights, then the growth in the air transport industry can result in an increase in the number of aircraft accidents. However, this linear assumption is not supported by aviation

accident statistics, which indicate a decrease in the number of aircraft accidents, as depicted in Figure 3.4 and 3.5 which indicate the number of accidents decreased although the number of passengers increased over a ten year period

3.8.1 Passenger growth at King Shaka International Airport

Internal passenger traffic statistics at King Shaka International Airport indicate a growth of 14% from the 2006/2007 to 2009/2010 financial years, with an average increase of 6% per year as listed below:

1. Passenger traffic increased from 4,257,714 in 2006/2007 to 4,873,571 in 2010/2011 yielding an increase of 14%.
2. Passenger traffic increased from 4,403,340 in 2009/2010 to 4,873,571 in 2010/2011 yielding an increase of 10.7 %.
3. The average increase in passengers from 2006/2007 to 2010/2011 is 6.1%.

The statistics include all domestic and international landing and departing passengers.

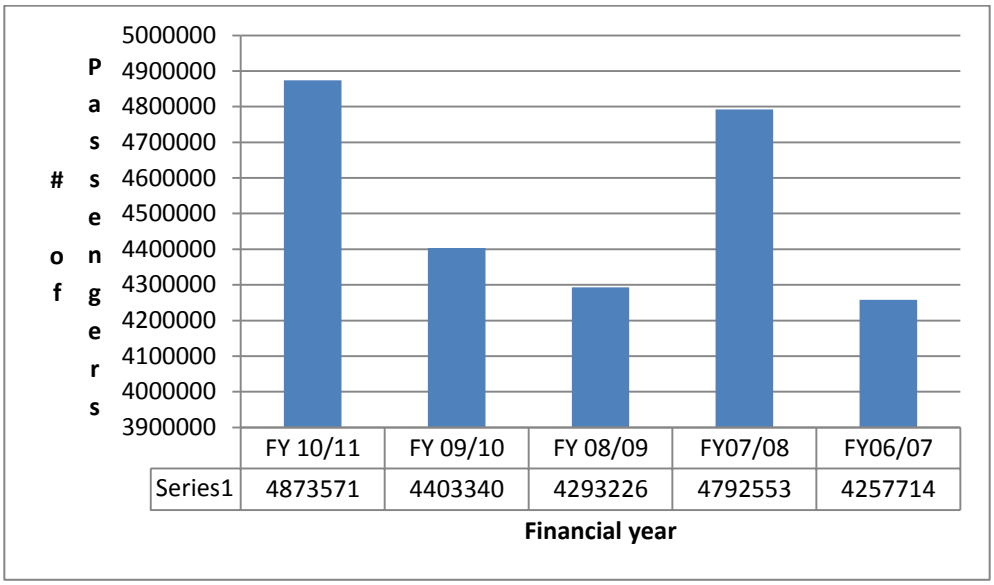

Figure 3.3: Passenger volumes for King Shaka International Airport 2006 to 2011

Source: ACSA

3.8.2 Worldwide aircraft accident statistics

A review of the worldwide aircraft accidents statistics has revealed that accident rates have been declining since the 1950s. Whilst there appears to be no strong correlation between the

number of fatal accidents and the number of fatalities, the statistics indicate that the overall reduction in accident rates does not correlate with the reduction in the fatality rate. Between 1990 and 2000 there have been a total of 511 fatal accidents with 13, 165 fatalities worldwide at an average of 25.8 fatalities per accident. Conversely, between 2000 and 2010 a total of 7, 019 people died in 271 aircraft accidents at an average of 25.9 fatalities per accident. From these statistics it can be concluded that whilst the accident rate dropped significantly, the average fatality rate increased from 25.8 to 25.9 per accident. Figures 3.4 and 3.5 respectively depict the number of fatal accidents and fatalities worldwide for the period 1990 to 2010.

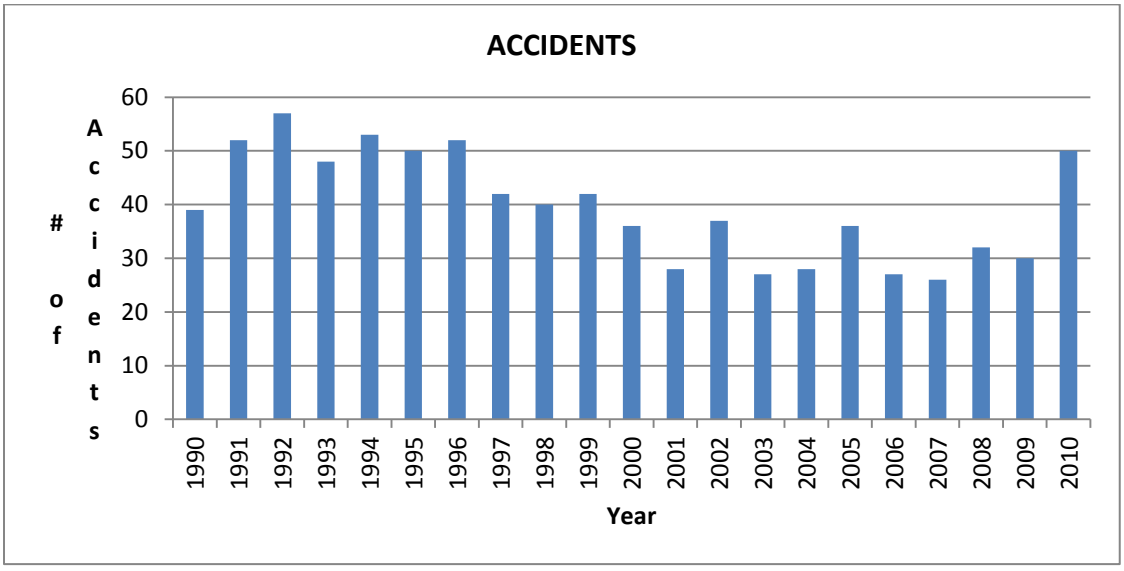

Figure 3.4: Worldwide fatal aircraft accidents 1990 to 2010

Source: Aviation Safety Network.

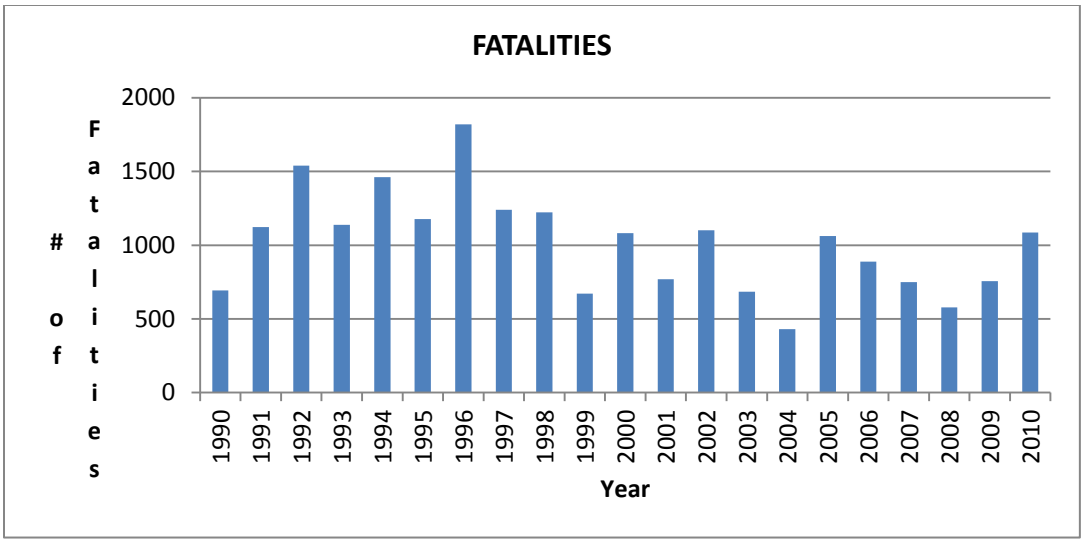

Figure 3.5: Worldwide fatalities in air transport accidents 1990 to 2010.

Source: Aviation safety Network 1990 – 2009
Source: AircrashInfo.com – 2010

3.8.3 Accidents by phase of flight

About eight per cent of all aircraft-related accidents occur en route to an aerodrome. These accidents will normally have little implication for ARFF operations unless the accident occurs near the airport or within the boundaries of a specific aerodrome.

Approximately 17% of aircraft accidents take place during the final climb or initial descent phase of the flight. These accidents will have implications for the ARFF operations. Of all accidents, 46% takes place during the initial approach, final approach and landing phases of the flight as depicted in Figure 3.4. All these accidents will cause concern for the ARFFS.

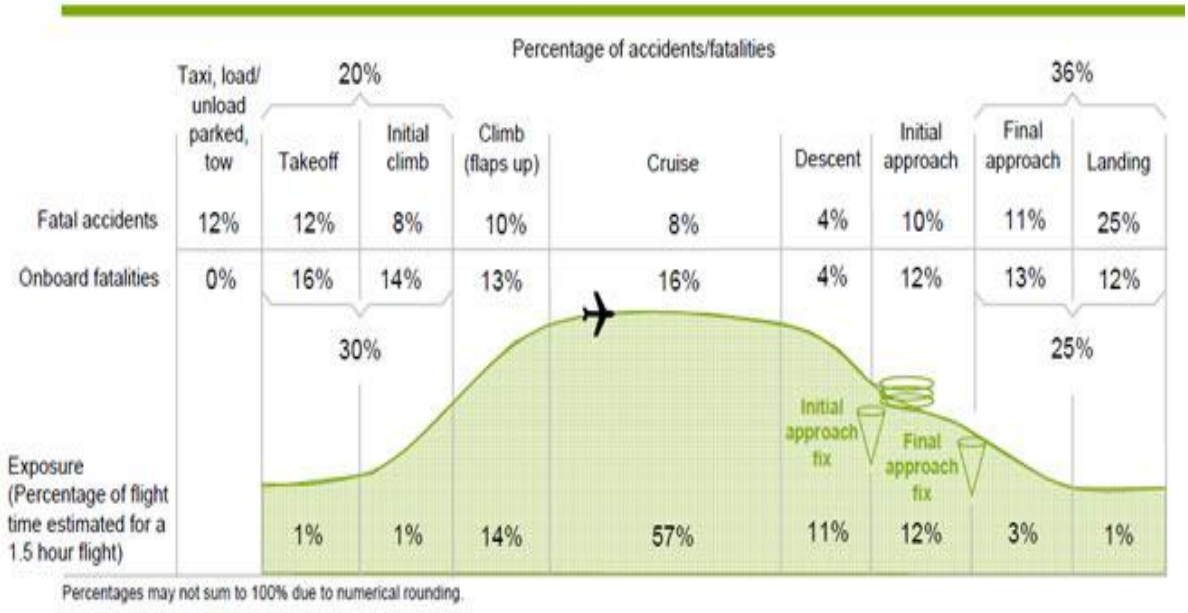

Figure 3.6: Accidents and Fatalities by Phase of Flight

Source: Statistical Summary of Commercial Jet Airplane Accidents, 1959 - 2008, Boeing

The discussion above indicates that should a commercial aircraft be involved in an accident in Durban, the probability that it will occur within the boundary of King Shaka International Airport aerodrome rescue firefighting service, is 92%. The firefighters at this airport will thus be the primary response unit.

3.9 PROTECTIVE FACTORS

Protective factors can be viewed as building blocks of resilience. The development of resilience depends on many different aspects between the individual's internal and environmental protective factors. Burt (2002: 138) states that research predominantly focuses on identifying protective factors; to learn how they work, for instance, whether they are independent, positive factors or whether they have effects primarily when there are risk factors that need to be alleviated. Heilemann *et al.* (2004: 90) suggest that social support, education, income, positive attitudes, sense of mastery, personal competence, acceptance of self and life, life satisfaction and the importance attached to spiritual beliefs, are examples of protective factors. This list of protective factors is expanded by McAlister *et al.* (2006: 183) who focus on hardiness, co-worker

and supervisor support as protective factors. Further protective factors will be indicated throughout this study.

3.9.1 Strengths

Slawinski (2005:82-83) defines resilience as an inner strength along with other protective factors. A strength-based perspective provides a holistic perspective that would encompass all of the attributes necessary to begin the recovery process. Therefore when exposed to the gruesomeness of an aircraft crash resulting in mass fatalities, a team of airport firefighters has a variety of strengths to rely on.

3.9.2 Training

Training is essential in developing the professional skills of all members of an airport rescue and firefighting service. When airport rescue firefighters (ARFF) are called to duty, they must use the skills and knowledge they have learned through experience and training to save lives and to protect property. As indicated throughout this study, it is a rare occasion when ARFF is called into action for an actual aircraft accident involving a commercial airliner. Owing to the fact that no commercial aircraft accident resulting in mass casualties ever occurred on South African soil, it can be concluded that airport fighters might work an entire career without having to respond to a mass casualty accident. It is for this reason that airport firefighters rely on initial and recurrent training to prepare them for aircraft emergencies, should one occur.

As indicated in Chapter 1, aerodrome rescue firefighters at King Shaka International Airport lack experience in dealing with aircraft disasters with mass fatalities, as none has ever occurred at a South African airport. The infrequency of significant emergency situations therefore makes training even more essential. The Airport Services Manual (Part 8) lists the benefits of training as:

(1) A source of personal motivation.
(2) Development of teamwork.

Firefighters undergo a lengthy period of pre-service training before attaining active-duty status. This intensive training continues for professional firefighters throughout their careers. Thus, a well-trained, experienced firefighter represents a considerable investment in human resources (Varvel *et al.* 2007:458). With reference to training, Section 9.2.34 of Annex 14 stipulates that all rescue and firefighting personnel shall be properly trained to perform their duties in an efficient manner, and shall participate in live fire drills commensurate with the types of aircraft and type of rescue and firefighting equipment in use at the aerodrome, including pressure-fed fuel fires. Section 9.2.35 further stipulates that a rescue and firefighting personnel training programme shall include training in human performance, including team coordination.

From the above discussion it can be concluded that training is a means of preparing airport firefighters for the occasion when they might be called upon to respond to aircraft disasters. It must also be noted that training, experience and prior exposure to stressful events have been associated with better outcomes after a disaster (Ursano *et al.* 1996; Weisaeth 1989). However, Mitchell and Dyrogrow (1993:905) warn against a perception that training and experience is the antidote against traumatic events. They confirm that no amount of training can eliminate stress reactions in those who walked among maimed bodies, disfigured body parts and the array of human miseries, which are present in disasters. In line with this assertion, more protective factors that should enhance the resilience of airport firefighters will now be discussed.

The international standard most widely accepted for ARFF is written in the ICAO International Standards and Recommended Practices Aerodromes – Annex 14 to the Convention on International Civil Aviation – volume 1 – Aerodrome design and operation. With reference to ARFF training, Annex 14 section 9.2.34 states that

> *All rescue and firefighting personnel shall be properly trained to perform their duties in an efficient manner, and shall participate in live fire drills commensurate with the types of aircraft and type of firefighting equipment in use at their aerodrome.*

In South Africa the South African Civil Aviation Authority (SACAA) regulates ARFF training. The SACAA regulation for ARFF is found in CAR 139.02.7. ARFF training is contained in the

ARFF Manual of Procedure – R&FFS doc.1. This procedure refers to the ICAO Annex 14 found in ICAO Doc 9137-AN/898 Parts 1 and 7.

3.9.3 Preparedness

The preparation of emergency responders helps prevent adverse psychological effects (Ehrenreich 2001:62). The author then rightfully states that rescue workers should be prepared beforehand as to what to expect, both practically and psychologically, in themselves and in the victims.

It is further suggested that preparation should focus on the particular disaster to which they are responding, because the closer their expectations are to the realities they will face, the greater their sense of predictability and control, the less their feelings of helplessness and uncertainty will be. The question is then posed, how do you prepare airport firefighters emotionally and psychologically to deal with mass casualties without exposing them to mass casualties? In the absence of practical exposure to mass casualties, focus will be on other protective factors.

Ehrenreich (2001:49) holds the view that government officials at local and national level often do not recognise or give much priority to the psychosocial effects of disasters. At an aircraft crash rescue workers will necessarily be focusing on the urgent task of saving lives, protecting property and extinguishing fires. These rescue workers themselves may see psychosocial services as unnecessary or even getting in their way.

3.9.4 Experience

The effect of prior experience in handling mass fatalities is inconclusive. McCarroll *et al*. (1995: 701) studied body handlers in mortuaries and found that the degree of anticipated stress related to the handling of dead bodies was significantly lower in those with prior experience. Converse to this finding, these findings are inconsistent with reports that negative adjustment following a disaster is associated with inexperience (McCarroll *et al.* 1993). Tucker *et al.* (2002:469) refer to studies that found less experienced body handlers often have more symptoms than more experienced ones.

3.9.5 Religion and spirituality

Spirituality and religion are often used interchangeably, but they are distinct, although overlapping concepts (Hodge 2001: 204). He explains that religion flows from spirituality, the latter being defined by him, as *"a relationship with God, or with whatever is held to be the Ultimate that fosters a sense of meaning, purpose and mission in life"*. Spirituality is confirmed as strength by researchers Canda (2002: 63); Moore (2003: 558) and Miley *et al*. (2004: 256). Religion is a strength which serves to stabilise individual's emotional lives, is linked to desirable emotional outcomes and plays a key role in promoting emotional resilience (Pargament 2010: 193).

Shaw *et al.* (2005:2) affirm that most of the world's religions, including Christianity, Hinduism and the Islamic faith view suffering as having an important positive role in our personal development and in our relationship with a higher being. As example, Christian teachings advise, *"But we also boast in our suffering, knowing that suffering produces endurance, and endurance produces character, and character produces hope, and hope does not disappoint us"* (Romans 5:5). From the above assertions it can be concluded that religion not only buffers against stress, but also contributes to personal growth after exposure to potentially traumatic events.

Healing is a central focus of religion in various cultures (Brende 1995:214). The same author holds the view that:

(1) Societies have historically been using religious rituals to help their traumatised citizens.
(2) For ages, cultures recognise that their warriors needed to have the opportunity for emotional and spiritual "cleansing" before being reintegrated into society.

Ochberg (1995:253) supports this view by confirming that long before psychology and psychiatry were invented and before medicine was a science, there were healers who treated the sick and the wounded. These healers used sacred rituals in which spiritual assistance was invoked by saying individual and collective prayers. Finally he confirms that *"there is an abundance of evidence that healing was facilitated through religion"*. Glicken

(2004:66) supports this assertion by stating that literature suggests that individuals who are involved in spiritual and/or religious practices cope better with life stressors, and as a result experience improved health and enhanced quality of life. This may occur with increased social supports and by providing people with positive views of themselves.

However, contrary to the above assertions, experiencing trauma might also result in a decline in spiritual/religious beliefs. Shaw *et al.* (2005: 3) assert that some people experience cynicism and a loss of religious commitment following trauma. It can thus not be assumed that all individuals exposed to potentially traumatic events will be protected by their religious beliefs.

3.9.6 Protective strengths within family

Empirical evidence exists confirming that families are a source of strength. Figley (1995: 345) suggests that families are effective in helping their members mitigate the unwanted consequences of traumatic events. This is evidenced by the fact that when people are exposed to highly stressful situations, especially stressors outside the family, members of the family, friends and others in one's social support network play a vital role in the recovery process. Supportive families are one of the most important factors related to resilience (Walsh, 1998:17) whilst Feldman *et al.* (1987:37) state that the social relationships among family members are one of the best protective factors of people.

Greene (2001: 65) supports this idea by stating that a family's ability to nurture and create safety and support, contributes to resilience, whilst Defrain and Asay (2007: 1) find that the family is one of society's oldest and most resilient institutions whose strengths are showing appreciation and affection, commitment, positive communication, enjoyable times together, spiritual well-being, and the ability to manage stress and crisis effectively. Within a strengths perspective, Anuradha (2004: 383) refers to family as an important social agency that meets the various needs of its members. By building on the strengths of family when it is facing challenges, one can enhance the value of families who have resources, knowledge and skills to call upon in times of crisis. In addition all individuals and families have many capabilities, abilities and strengths, which come from experiences, characteristics, roles etcetera.

Freedman (2004:381) rightfully state that firefighters are active participants in two families namely the firefighter family at work and the other domestic family at home. He then states that the kinship-like relations among firefighters are crucial to their ability to get the job done and to their survival at potentially traumatic events. Pfefferbaum *et al.* (2002:364) provide an example by stating that the Oklahoma City firefighters, who participated in studies related to the bombing in Oklahoma City in 1995, identified their spouses and families as the most valuable sources of emotional support following the incident.

3.9.7 Protective strengths amongst firefighters

Firefighting is rich in history as found by research conducted on a sample of firefighters who responded to the World Trade Centre disaster research findings. Freedman (2004: 380) confirms that the occupational inheritance of firefighters provides its own common history and shared subculture.

It is further stated that firefighters have certain values in common. A journalist interviewed by Freedman (2004: 380) after the World Trade Centre disaster said of firefighters *"…if you look at their demographic profiles you would see that they are all the same. It is the same culture ... [and] outside of work they are literally blood relatives"* (Freedman 2004: 380). The same author reports that firefighters depend on each other by stating that a cardinal value of firefighters is expressed commonly as *"never let a guy down".*

By own observation it is observed that firefighters are like a community who live together, fight together, have arguments, but when exposed to potentially traumatic events, they are always there for one another. What can be viewed as a protective factor, firefighters believe that their peers will be there to back each up in difficult situations as they learn the strengths and weaknesses of each one working and living at the fire station.

Research findings (Freedman 2004: 381) found that the relationship among firefighters is based on a communal sense of cooperation and respect and is united in their daily work, at times of celebration, and in the face of loss and sorrow.

3.10 SUMMARY

South Africa has an excellent record in aviation safety with records indicating that no aviation disasters ever occurred on South African soil. However, this does not mean that aviation disasters will not occur at this airport. In preparation of potential aviation disasters, the typical psychological and physical profile of the aerodrome rescue firefighters was explored and discussed.

The principal objective of aerodrome rescue and firefighting services is to save lives and this is performed in a regulated environment, which was explored from an international, national and local level. Using the Pressure and Release Model, the root causes of aviation disasters were explored as well as the dynamic pressures leading to unsafe conditions in the aviation industry. However, the focus of this study is on resilience and therefore focus was placed on the progression to safety instead of progression of vulnerability.

It is acknowledged that firefighting is one of the most dangerous and stressful occupations. The risk factors affecting the resilience of firefighters were therefore explored before the chapter was concluded with a description of the protective factors enhancing their resilience.

CHAPTER FOUR

RESEARCH METHODOLOGICAL EXPLANATION OF THE QUESTIONNAIRE

4.1 SELECTING THE MEASURING INSTRUMENTS

This chapter encompasses a methodological explanation of the questionnaire used as measuring instrument in the empirical chapter of this study. According to Monette *et al.* (2002: 103-104) measurement refers to the process of describing abstract concepts in terms of specific indicators by assigning numbers or other symbols to these indicators in accordance with specific rules.

4.1.1 Validity

As stated by Babbie (2004: 143) validity refers to the extent to which an empirical measure accurately measures what is intended to be measured. This means that the measuring instrument actually measures the concept in question, and that the concept is measured accurately.

4.1.2 Reliability

Reliable instruments are very important to the success of survey results. As pointed out by de Vos (2005: 162). Instruments that are reliable are those which measure that which is intended to be measured in a consistent manner. Reliability is thus not concerned with what is being measured, but how well it is measured. In other words it refers to a measuring instrument's ability to produce the same results each time it is used. Reliability is expressed statistically as a correlation coefficient, which is usually in the range of 0.60 to 0.80 for attitude scales. According to Heilemann *et al.* (2004: 91), coefficients above 0.70 are considered acceptable for established instruments and above 0.60 for newly developed instruments with fewer items.

4.1.3 Instruments to measure resilience

A search for suitable instruments to measure the resilience of firefighters at King Shaka International Airport revealed that a number of measuring instruments are available as depicted in Addendum B, including the following:

- Baruth Protective factors Inventory (BPFI).
- Connor-Davidson resilience Scale (CD-RISC)
- Resilience Scale for Adults (RSA)
- Adolescent Resilience Scale (ARS)
- Brief Resilient Coping Scale (BRCS)
- Resilience Scale (RS)

In acknowledgement of the requirements for validity, reliability and availability of measuring instruments in order to measure the level of resilience of the firefighters at King Shaka International Airport, the following measuring instruments were used:

- The Resilience Scale to measure individual resilience
- The Dispositional Resilience Scale to measure psychological hardiness.
- A self constructed biographical questionnaire to obtain data not sufficiently covered in the Resiliency Scale or Dispositional Resilience Scale.

4.2 THE RESILIENCE SCALE

The standardised Resilience Scale of Wagnild and Young (1993) was selected as primary measuring instrument to measure the level of resilience amongst the firefighters at King Shaka International Airport (Part B of questionnaire).

4.2.1 Development of Resilience Scale

The Resilience Scale was derived from a 1987 qualitative study of 24 older women who had experienced a recent loss (e.g. loss of spouse, health or employment) and had successfully coped with the loss, and a qualitative study of 39 caregivers of spouses with Alzheimer's disease (Wagnild 2009:25).

From this qualitative research, Wagnild and Young identified five essential characteristics of resilience, namely self-reliance, meaning, equanimity, perseverance, existential aloneness through qualitative studies followed by a review of the literature. In 1990 these characteristics were further defined and described through a review of the literature on coping and adaptation. The five characteristics serve as the conceptual foundation for the Resilience Scale. In the ensuing years, these five characteristics continued to describe resilience (Wagnild 2009:25).

The initial Resilience Scale consisted of 50 items, each of which was a verbatim statement from the initial qualitative studies. After initial analysis, the scale was reduced to 25 items reflecting five characteristics of resilience, and was initially available and pre-tested in 1988 (Wagnild 2009: 25).

According to Wagnild (2010:24) the Resilience Scale, published in 1993, was the first instrument designed to measure resilience directly. Since 2006, more than 4 500 researchers, organisations and clinicians have requested permission to use the Resilience Scale with a variety of populations ranging from adolescents to the very old. Published studies in which the Resilience Scale was used to measure resilience indicate that it is simple to use, useful for a wide range of ages and socioeconomic groups and reliable. Support for the validity of the Resilience Scale continues to grow.

Wagnild, (2010:24) confirms that reliability of the Resilience Scale is assured with alpha coefficients ranging from 0.84 to 0.94 and that factor analysis indicate that the Resilience Scale has two major factors, namely:

(1) “Acceptance of self and life”, which encompasses adaptability, balance, flexibility and a balanced perspective of life.
(2) “Personal competence” which suggests self-reliance, independence, determination, mastery and resourcefulness.

Instrument validity is defined as the extent to which an instrument measures what it is intended to measure whilst construct validity is refers to the extent to which a particular measure relates

to other measures consistent with theoretically derived hypothesis concerning the concept to be measured (Wagnild 2009:24).

4.2.2 Justification for using the Resilience Scale

The benefits of using the Resilience Scale, according to Wagnild (2010: 29), include the following:

(1) Easy To use. The Resilience Scale is readable, and can be self-administered.
(2) Quick to complete. The Resilience Scale takes only 5 to 7 minutes to complete.
(3) Easy to score. There is no reverse scoring in the Resilience Scale, and a simple totalling of item responses lead to a total resilience score.
(4) Applicable to almost any age group. The resilience scale has been used effectively with samples ranging from adolescents to the elderly.
(5) Valid. There is solid research support for the Resilience Scale's content and construct validity.
(6) Reliable. The Resilience scale has dominated internal consistency reliability with alpha coefficients ranging from 0.84 to 0.94.
(7) A strength-based measure. The resilience Scale focuses on positive psychological qualities rather than deficits.

4.2.3 Published studies using Resilience Scale

The Resilience Scale has been used by several researchers in the study of resilience. Demarcation of these studies include both sexes, all ages and different ethnic groups, adolescent mothers, Irish immigrants, resilience and older women, Alzheimer family caregivers, Mexican women and depression, sheltered battered women, adolescents, mothers, young adults, military mothers and resilience in older adults. A list of published studies in which the Resilience Scale was used is attached as Addendum F.

4.2.4 Measuring resilience

The Resilience Scale used to evaluate the level of resilience amongst the aerodrome rescue firefighters at King Shaka International Airport consists of 25 questions grouped under five characteristics with five questions each. This section details the questions used to evaluate the various resilience characteristics as developed by Wagnild and Young (1993).

- ✓ **Self-reliance**

Self reliance is viewed by Wagnild and Young as a belief in oneself and one's capabilities and refers to the ability to depend on oneself and to recognise personal strengths and limitations (Wagnild 2009: 26). This characteristic is measured by Table 4.1.

TABLE 4.1: MEASURING SELF RELIANCE

SELF RELIANCE
I usually manage one way or another.
I feel that I can handle many things at a time.
I can get through difficult times because I've experienced difficulty before.
In an emergency, I am someone people can usually rely on.
When I am in a difficult situation, I can usually find my way out of it.

Source: Wagnild and Young

- ✓ **Purposeful life/meaning**

To evaluate if an individual views him/herself as having a purposeful life, defined by Wagnild and Young as the realization that life has a purpose and the evaluation of one's contributions or believing that there is something to live for (Wagnild 2009: 26) is measured by obtaining answers to five questions as listed in Table 4.2

TABLE 4.2: MEASURING MEANING

MEANING
Keeping interested in things is important to me.
I feel proud that I have accomplished things in my life.
I seldom wonder what the point of it all is.
I keep interested in things.
My life has meaning.

Source: Wagnild and Young

✓ **Equanimity**

As indicated by Wagnild and Young equanimity provides a balanced perspective of one's life and experiences. It thus refers to the ability to consider a broader range of experience and to take life as it comes, thus moderating extreme responses to adversity (Wagnild 2009: 26). The level of equanimity is measured as listed in Table 4.3

TABLE 4.3: MEASURING EQUANIMITY

EQUANIMITY
I usually take things in my stride.
I take things one day at a time.
I can usually find something to laugh about.
I can usually look at a situation in a number of ways.
I usually do not dwell on things that I can't do anything about.

Source: Wagnild and Young

✓ **Perseverance.**

Perseverance is defined as the act of persistence despite adversity or discouragement. It therefore refers to a willingness to continue the struggle to reconstruct one's life, to remain involved and to practise self-discipline (Wagnild 2009: 26). Table 4.4 provides a measuring instrument to measure perseverance.

TABLE 4.4: MEASURING PERSEVERANCE

PERSEVERANCE
When I make plan, I follow through with them
I am determined.
Self-discipline is important.
Sometimes I make myself do things whether I want to or not.
I have enough energy to do what I have to do.

Source: Wagnild and Young

✓ **Existential aloneness**

The realization that each person's life path is unique defines existential aloneness. It acknowledges that while some experiences are shared, there remain others that must be faced alone (Wagnild 2009: 26). This characteristic confers a feeling of freedom and sense of uniqueness and is measured by obtaining answers to questions tabled in Table 4.5.

TABLE 4.5: MEASURING EXISTENTIAL ALONENESS

EXISTENTIAL ALONENESS
I am able to depend on myself more than anyone else.
I can be on my own if I have to.
I am friends with myself.
My belief in myself gets me through hard times.
It is OK if there are people who do not like me.

Source: Wagnild and Young

4.2.5 Interpretation of Resilience Scale

The Resilience Scale has been used in many studies (Wagnild 2009: 80). The data provided in the table below are from a variety of study samples. Resilience scores range from 25 to 175. Scores higher than 145, indicate moderately high to high resilience, whilst scores between 116 and 144 indicate moderately low to moderate levels of resilience. Scores of 115 and below indicate very low resilience.

TABLE 4.6: INTERPRETATION OF THE RESILIENCE SCORES

25 to 100	The resilience level of individuals within this group is very low but this does not mean that they have zero resilience. Everyone is resilient to some degree. They can strengthen their resilience and doing so will make a significant and positive change in their lives.
101 to 115	The resilience level of individuals within this group is low but this does not mean they have zero resilience. Everyone is resilient to some degree. They can strengthen their resilience and doing so will make a significant and positive change in their lives.
116 to 130	The resilience level of individuals within this group is low but this does not mean they have zero resilience. Everyone is resilient to some degree. They can strengthen their resilience and doing so will make a significant and positive change in their lives.
131 to 144	The resilience level of individuals within this group is moderate; neither high nor low. The good news is that they possess many characteristics of resilience and can build on those to keep strengthening their resilience. They can strengthen their resilience and doing so will make a significant and positive change in their lives.
145 to 160	The resilience level of individuals within this group is moderately high, which means that they are doing well but believe they can do better. They possess all of the characteristics of a solid resilient personality but would like to strengthen their resilience. They would benefit from recognising their own strengths in resilience but also areas where they are not as strong. *Continues*

161 to 175	The resilience level of individuals within this group is high. They are doing very well in almost all aspects of resilience. Empirical evidence exists that proves people who scored between 161 and 175 are rarely if ever depressed or anxious about their lives. High resilient scores usually indicate very purposeful lives that see life as an adventure and others describe them as optimistic and upbeat. They: • Enjoy their own company and the company of others. • Have balance between work and play. • Sometimes have difficult and painful events including illness, death of family and friends, unemployment and so forth. But unlike less resilient people, they are able to regain their equilibrium and keep moving forward. They have weathered many storms before and are confident that they will manage again. • Are dependable and resourceful. • Are sought out by others because they are able to look at situations in a number of ways and therefore have a healthy perspective of life. • Are self-confident, and overall is satisfied with their lives.

Source: Wagnild

4.2.6 Rules on entering survey data

The following rules will be applied when entering data from the survey forms:

1. If a respondent marks two responses that are adjacent to each other, the response that indicates the least favourable response will be chosen. For example, if the respondent circles 3 and 4 for an item, the 3 will be entered for that item.
2. If a respondent marks two non-adjacent responses for an item, for example 2 and 5, that item will be coded as "missing".
3. If a respondent marks three or more responses for an item, that item will be coded as "missing".
4. All items in the Resilience Scale are positively written. No scores are thus reversed or modified prior to calculating scores. There is no transformation of scores required.

4.3 THE DISPOSITIONAL RESILIENCE SCALE

Bartone's (2009) Dispositional Resilience Scale is used to measure psychological hardiness. (Part C of questionnaire). Psychological hardiness/toughness is measured in addition to overall resilience because the researcher holds the view that this aspect of resilience is vitally important during the initial stages after arrival at an aircraft crash. During this phase the on-duty airport

firefighters will be dealing with this scene by themselves whilst awaiting the arrival of their municipal counterparts, ambulance personnel and other responding agencies.

4.3.1 Justification for Dispositional Resilience Scale

The 15 item Dispositional Resilience Scale DRS15 (v.3) is selected as a measuring instrument of hardiness. It is designed to measure psychological hardiness by measuring the presence of the three tendencies that characterise hardiness, namely challenge, commitment and control. It was discussed under characteristics promoting individual resilience which resides under the micro level of the ecological system on page 16 of Chapter 2 of this study.

The **DRS15(v.3)** is the most recent and up-to-date version of the 15-item Dispositional Resilience Scale currently available. It incorporates several improvements made as a result of Fulbright research conducted by Dr Bartone in Norway (2006-07). The DRS15-R is designed to be better balanced and more culture-free than earlier versions. Several items and phrases identified as idiomatic in nature and difficult to translate accurately from English have been modified or replaced. There are five items each to measure the hardiness facets of commitment, control, and challenge. Six items are negatively keyed, which makes this scale quite well-balanced for negative and positive items.

4.3.2 Scoring key for Dispositional Resilience Scale

The level of psychological hardiness amongst the firefighters at King Shaka International Airport was calculated by means of the Standardised Dispositional Resilience Scale attached as Addendum H, with the following rules applying:

1. Scores were reversed on six negatively keyed items: 3, 4, 8, 11, 13, 14
2. The level of commitment (CM) was calculated by the sum of items: (1+4+7+10+13)
3. The level of control (CO) was calculated by the sum of items: (2+6+8+12+15)
4. The level of challenge (CH) was calculated by the sum of items: (3+5+9+11+14)
5. The total hardiness-resilience score was calculated by the sum of: (CM+CO+CH)

4.3.3 Rules on entering data

The following rules are adhered to when entering data into the Dispositional Resilience Scale:

1. If a respondent marks two responses that are adjacent to each other, the response that indicates the least favourable response will be chosen.
2. If a respondent marks two non-adjacent responses for an item, for example 2 and 5, that item will be coded as "missing".
3. If a respondent marks three or more responses for an item, that item will be coded as "missing".
4. Items 3, 4, 8, 11, 13 and 14 of the Dispositional Resilience Scale are negatively written. The scores for these items are thus reversed or modified prior to calculating scores.

Source: Paul T. Bartone

4.4 THE BIOGRAPHICAL QUESTIONNAIRE

A self-constructed questionnaire (Part A) was used to evaluate all items not sufficiently covered in the Resilience Scale or Dispositional Resilience Scale. The items covered in the biological questionnaire include rank, age, gender, education, health, reported frequency of depression, work experience, training received, frequency of exposure to mass casualty events, forms of psychosocial support most likely to be used, and level of support networks of the target population.

4.5 SUMMARY

A well designed and constructed questionnaire, comprising of three distinct sections to measure the levels of resilience amongst the target group, the levels of mental hardiness and additional information required in order to answer the research questions was used. The objective was to evaluate the general mental preparedness of airport firefighters at King Shaka International Airport to deal with aircraft disasters resulting in mass fatalities, grotesque burn injuries, multiple fractures, mutilations and suffering.

It was done in order to determine how best the Airports Company South Africa could provide support for and after exposure to potentially traumatic events.

The standardised Resilience Scale, developed by Wagnild and Young was used to measure the levels of resilience amongst the target population. The standardised Dispositional Resilience Scale, developed by Bartone, was used to measure the level of mental hardiness amongst the same population group. A self-constructed biographical questionnaire provided all additional data that were not obtained from either of the mentioned standardised resilience scales.

CHAPTER FIVE

Empirical Study

5.1 METHOD OF DATA COLLECTION

Methods of collecting, analysing and interpreting data collected during the empirical investigation are outlined in this chapter. This chapter encompasses the empirical study undertaken to address the four primary goals as identified in terms of an empirical approach. The outline consists primarily of two parts, namely a part in which the work procedure with data collection is outlined, a section in which the results obtained from the questionnaires are outlined and interpreted.

The responding fire and rescue staff compliment at King Shaka International Airport consists of 60 firefighters, excluding two firefighters who was transferred to the Airport Security department before the empirical stage of this study was commenced and two firefighters whose employment was terminated during following disciplinary processes. Lastly one firefighter was on annual leave during the approved period during which the questionnaires were administered. A total of 59 questionnaires were handed out to potential participants and 59 were completed and received back (See Addenda J).

In order to provide fire cover 24/7 the firefighters are divided into four platoons (shifts). Working 12 hour shifts work cycles consist of two day shifts, followed by two night shifts and concluding with four rest days. The questionnaires were therefore administered over eight sessions on four separate days.

5.2 PILOT INVESTIGATION AND ITS RESULTS

A pilot investigation was held with four participants consisting of one female and three male firefighters including one Head of Department, one Grade 3 and two Grade 1 firefighters.. One

Coloured, one Indian and two Black (Zulu) firefighters participated. The pilot study produced the following results:

1. The self-constructed questionnaire (Addendum C) used in the pilot study indicated approximately 45 minutes. However, all participants completed it within 30 minutes. The data was amended to reflect that the questionnaire should be completed in approximately 30 minutes.

2. Question eight was amended to ascertain if the participants had ever been exposed to any accidents with multiple fatalities, grotesque burn injuries, multiple fractures or mutilations, with reference to aircraft accidents.

3. None of the participants indicated a lack of understanding of the term "resilient" as used in question 24. However, during the second session of questionnaire administration, two participants requested clarification of this term. This question was elucidated by the researcher providing a verbal explanation for this group and before commencement of the next groups. The final questionnaire is appended as Addendum B.

5.3 AIM OF THE RESEARCH

The overarching aim of the study was to engage in an exploratory and descriptive investigation of the protective and risk factors of airport firefighters to the impact of exposure to mass fatalities, mutilation, grotesque burn and other injuries and suffering, so that guidelines for the formulation of scientifically founded, pro-active programmes may be formulated to enhance strengths and build resiliency by ensuring preparedness of airport firefighters. In an effort to achieve the above-mentioned aim, the following primary and secondary goals of the study were distinguished:

Primarily, it was striven to:

- To explore and describe the protective factors of the airport firefighters, which contribute to their resiliency in the work place.

- To determine and describe the risk factors of the airport firefighters, which give rise to challenges for their resiliency in the work place.
- To determine and describe which actions by the employer could potentially result in building and enhancing resiliency of the airport firefighters.

Secondarily it was striven to:

- To make the results of the research, as well as the guidelines that emanate from the research, available to the Airports Company of South Africa so that existing policies may be assessed and modified.
- To build the body of knowledge of the resiliency of airport firefighters, who in the disaster response phase, will be the first responders to aviation disasters at the airport.

5.4 OBJECTIVITY OF THE RESEARCHER

Factors that may influence the interpretation of the data gathered in the empirical investigation are discussed in this section. A number of factors could have played a role during the investigation when data were collected and interpreted. For this reason, it is necessary to highlight a number of factors that could play a role in collecting and interpreting the qualitative data that were obtained from the empirical investigation.

In Chapter 1, the points of departure that may impact on the study are outlined, namely that people possess the ability to bounce back from adversity as a product of the protective factors at their disposal enhancing their resilience. Moreover, the point of departure is emphasised that no single protective factor can be accredited as the cause of resilience, but that resilience is formed by a number of traits and processes.

Further factors of importance are:

- Resiliency was explored from a strengths perspective. This was done to deviate from previous studies conducted on firefighters that predominantly focussed on pathology instead of the inner strengths personal experience proved firefighters possess.

- An ecological approach was utilised due to personal experience which demonstrate that after working together as firefighters over a period of time, they become a family. In conjunction with their relationship with the family at home and at work, firefighters, like all people do, function within an ecological system.
- The researcher is employed by the Airports Company South Africa as the Chief Fire Officer at the King Shaka International Airport and is responsible for the administration of policies, procedures and legislation that provides for the safety of all airport users, the flying public and stakeholders. This aspect presents an experiential dimension to the analysis and interpretation of the findings of the study.
- The researcher is male, married with 27 years full time experience in professional fire and rescue services which include six years in aviation firefighting.

Taking the above factors, as well as the outcome of the questionnaire process into account, the researcher's level of objectivity in the analysis of data for this study is demonstrated. Interpretations of the results of the empirical investigation is derived from the research problem, the literature and theoretical frameworks of the study, the methodology of the investigation and the researcher's experience within the chosen field.

5.5 RESULTS OBTAINED FROM THE COMPLETED QUESTIONNAIRES

The analysis and details regarding the biographical characteristics of the sample were evaluated within an ecological system comprising the individual, at the Micro level, the family, at the Meso level and the work family, at the Exo level.

5.6 MICRO LEVEL – THE INDIVIDUAL

The protective strengths within the individual were evaluated as follows:

5.6.1 Analysis of the sample

The sample consisted of 59 firefighters employed at the King Shaka International Airport. At the commencement of this study 64 firefighters were employed at this airport, but before the commencement of the empirical phase of the study, two had been transferred to the security section and two firefighters employment with the Airports Company South Africa was

terminated. To-date none of the four positions is filled thus resulting in a total of 60 firefighters being available as research sample. One of the 60 firefighters was on annual leave resulting in the 59 respondents who completed and returned the questionnaires presenting 98.4% of the total population. The biographical characteristics of the sample as obtained from the biographical section of the questionnaire are indicated in Tables 5.1 to 5.6

Table 5.1 indicates the three groups into which the sample population was categorised according to age.

TABLE 5.1: MEASURED RESILIENCE PER AGE GROUP

Age groups	Frequency	Min resilience	Max resilience	Median	Total resilience measured	Mean
18 to 29	26	123	175	145	3789	145.73
30 to 39	18	124	175	150	2723	151.23
40 to 49	15	123	167	146	2190	146

The Table 5.1 indicates that at King Shaka international Airport the majority of firefighters (75%) are aged between 18 to 39 years. Only 15 (25%) of firefighters are in the age category 40 to 49 years. Across all three age groups the mean (average of the sample) and the median (the score at which half of the sample will be above and the other half below this score) are found to be almost identical. It can be deduced that none of the age groups has a low level of resilience as the average level of resilience across all age groups are between 146 and 161 which means that the levels of resilience per age group at this airport is moderately high and that the age of firefighters at King Shaka International Airport does not affect their levels of resilience.

TABLE 5.2: RESILIENCE PER GENDER

Gender	Frequency	Min resilience	Max resilience	Median	Total resilience measured	Mean
MALE	56	123	175	147	8272	147.71
FEMALE	3	124	156	150	430	143.33
TOTAL	59					

Table 5.2 indicates that the compliment of firefighters at King Shaka international Airport consists mainly of men (95%) and only three being female, with the males found to be more resilient than females. From this information, in line with the discussion in 2.4.1 and 2.5 the deduction is made that the gender profile contributes to the high level of overall resilience at

this airport. However, the females, although less resilient than the males, also share a high level of resilience.

TABLE 5.3: MARITAL STATUS

	Frequency	Min resilience	Max resilience	Median	Total resilience measured	Mean
Married	24	123	168	146	3582	149.25
Single	31	123	175	150	4498	145.1
Living together	2	124	169		293	
Divorced	2	154	175		329	

The married firefighters at King Shaka International Airport, according to Table 5.3, are more resilient than their counterparts who are not married. Although the majority of participants do not fall in the first mentioned category, it is not considered to be a challenge to the resilience of the sample as the single participants, although less resilient than their married counterparts, also share a high level of resilience and the number of married and the number of single participants is almost the same.

5.6.2 Self reported health and corresponding resilience

This question was included to evaluate the relationship of health status on resilience.

About 73% of the respondents reported very good to excellent health whilst 25% reported good health and only and only one firefighter (1.6 %) reported that his/her health is fair. None of the respondents reported that their health is poor. Good health is positively linked to resilience as demonstrated in Figure 5.1.

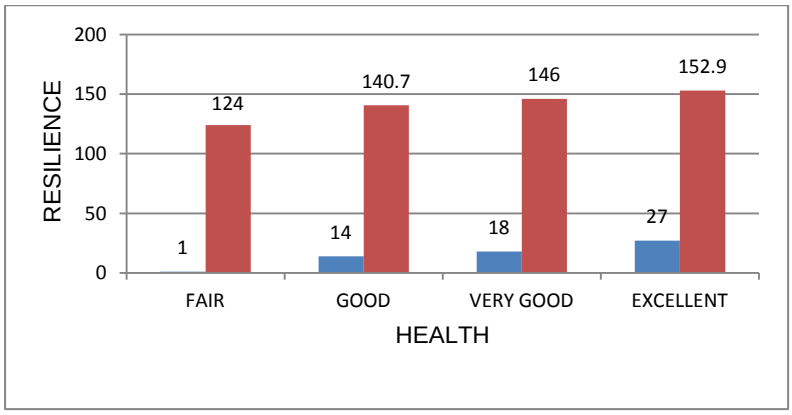

Figure 5.1: Self-reported health status with corresponding levels of resilience

Figure 5.1 indicate that those reporting better health scored higher on resilience. It is noted that those who indicated fair health scored the lowest on resilience. As the self reported health status improve from good to very good and ultimately excellent, the levels of resilience also increased proportionately.

TABLE 5.4: SELF-REPORTED FREQUENCY OF DEPRESSION

	Frequency	Min resilience	Max resilience	Median	Total resilience measured	Mean
Never	27	123	168	149	3966	146.9
Sometimes	30	123	175	147	4415	147.2
Frequently	2	146	175		321	160.5

Table 5.4 reveal that he majority of the participants (97%) never or only sometimes experienced symptoms of depression. As a result of the discussion in 2.2; 2.2.3 and 2.6.1 the deduction is made that for most participants in this study frequency of depression is not a risk factor but rather a protective strength.

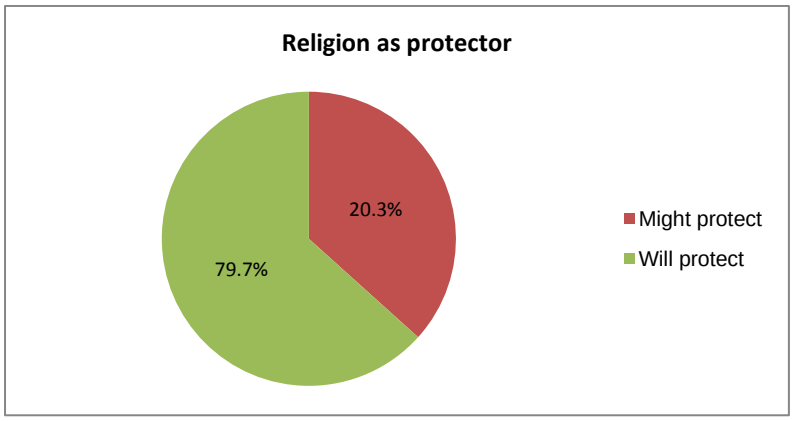

Figure 5.2: Religion as perceived protector

Religion is viewed as a strength that will certainly protect the population group against the gruesomeness of dealing with aircraft accidents resulting in mass fatalities, grotesque burn injuries, multiple fractures and suffering by 79,7% of them, with the remaining 20,3% are not absolutely sure if this will happen but indicate that religion might protect them. However, none of the respondents indicated a perception that that religion will not protect them.

5.6.3 Self-rated mental preparedness

Disaster preparedness not only involves the compilation of disaster response plans and rehearsals of those plans. One of the often overlooked variables within disaster management plans is the mental preparation of the first responders. An evaluation is thus conducted to determine the perception of aerodrome rescue firefighters on their own perceived mental preparedness.

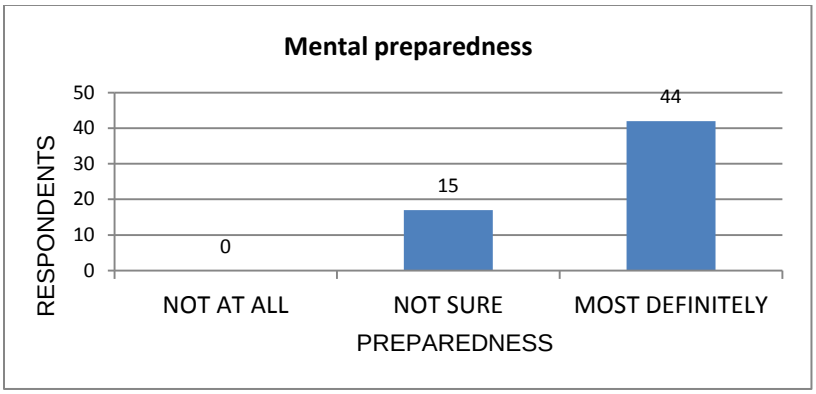

Figure 5.3: Self rated mental preparedness of respondents

In figure 5.3 it was found that 74.6% of the firefighters at King Shaka international Airport perceive themselves as most definitely being prepared to deal with mass fatalities, grotesque injuries and suffering when exposed to aviation disasters. Not a single respondent indicated that they are not at all prepared with the remaining 25.4% of the research population indicating that they are not 100% if they are prepared. The reasons for participants to this study not being sure if they are mentally prepared to deal with mass fatalities, grotesque injuries, death and dying patients, as attached as Addendum D, is dominated by a response that, to-date, they were never exposed to aviation disaster to-date, and therefore do not know how they will react.

5.6.4 Self-rated levels of resilience

The objective of this study was to evaluate the resilience amongst firefighters at King Shaka international Airport. Although a standardised Resilience Scale was used to evaluate this resilience, this question was included to gain an understanding of how the sample perceived their own levels of resilience before resilience was measured using a standardised scale. A

comparison was then drawn between the participant's perceived level of resilience and the measured level of resilience.

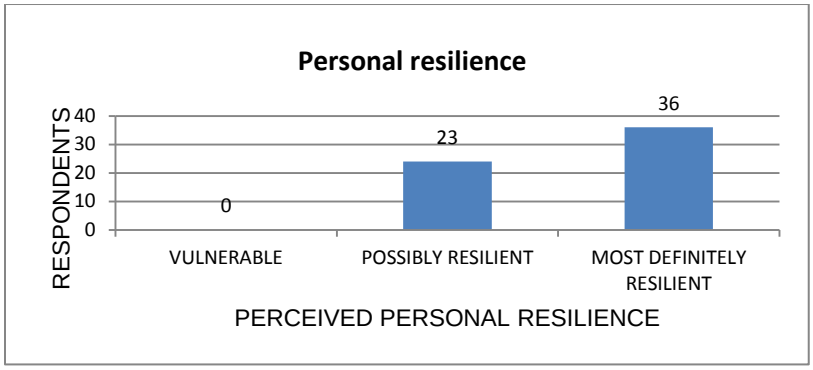

Figure 5.4: Self related levels of personal resilience

Not a single respondent perceives themselves as being vulnerable as all of them perceive them as being resilient. 61% perceive themselves to be most definitely resilient with 39% confirming moderate assurance of resilience. This finding is also informed by the fact that the responders have never been exposed to aviation disasters, and therefore do not have a benchmark against which to evaluate them.

5.6.4 Social support to the individual.

The relevance of social support to this study is derived from discussions in 3.6; 3.9 and 3.9.6 in which reference is made to research findings that lack of social support increase vulnerability. Converse to this, healthy social support networks contribute to resiliency. This question endeavour to evaluate the degree the participants to this study believe that they are loved and cared for by their friends and others.

- **Social support from friends**

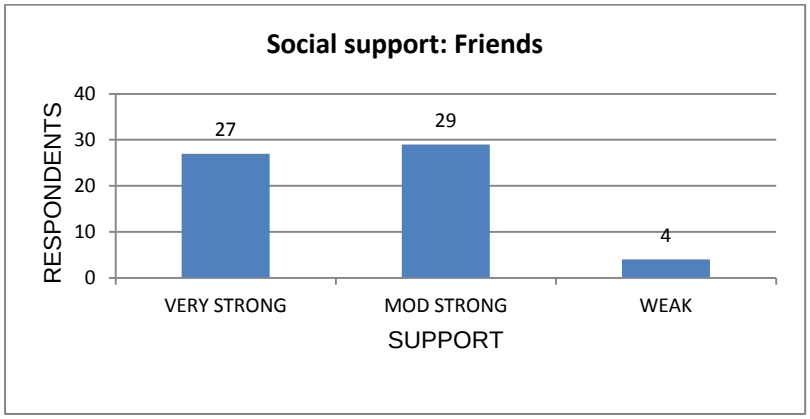

Figure 5.5: Perceived level of social support from friends

Friends are a strong source of social support as 55 (93, 2%) perceive their friends as providers of physical and emotional support, which indicate that social support is available even when off-duty. At the end of a shift which included a potentially traumatic event, and firefighters proceed off-duty, it is good to know that they have support outside of the working environment.

From the above concluded that all of the firefighters at King Shaka International Airport know that they are part of a community of people who love and care for them and will provide them emotional comfort. Whilst a miniscule number indicate that their support, although available, is weak, the overwhelming majority describe their social support as at least moderately strong.

5.7 MESO LEVEL – THE FAMILY

Supportive families are considered as one of the most important factors related to resilience. Protective strengths within the family were evaluated by the following:

As discussed in 2.4.2 one of the most important factors in promoting resilience is a positive, caring relationship, which includes the social network ranging from family, friends and work. This section therefore evaluates the level of social support available to the firefighters at King

Shaka International Airport as well as the extent to which they perceive the relationship with their families being positive and caring.

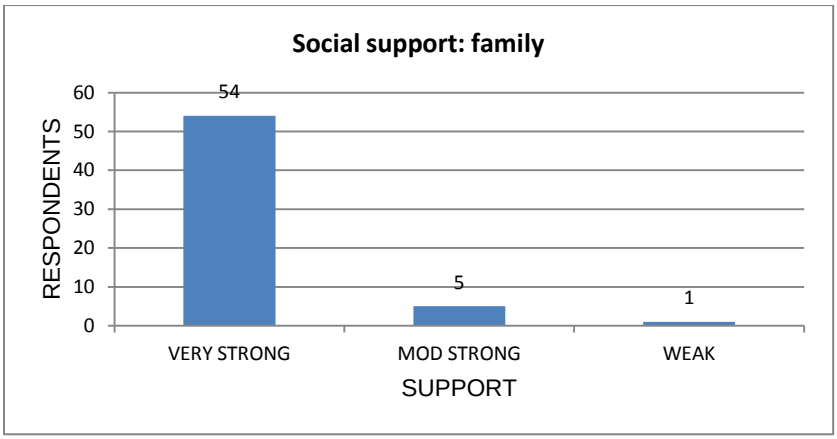

Figure 5.6: Perceived levels of social support from the family

All except one firefighter indicate that the social support received from their families is weak, whilst 90% declaring that the social support received from their families are very strong. Reliable social support outside of work after traumatic exposure therefore is viewed as a protective factor, as almost all these firefighters, as deduced from the discussion in 2.4.3, can depend on physical and emotional comfort from their families. A correlation is found between social support from family and relationships as depicted in 5.5.12 as this individual indicates that the relationship with his family is only sometimes characterized as being positive and caring. This individual also indicates that communication within his family is not at all positive whilst the remainder of the participants all indicates strong social support from their families and positive family communication.

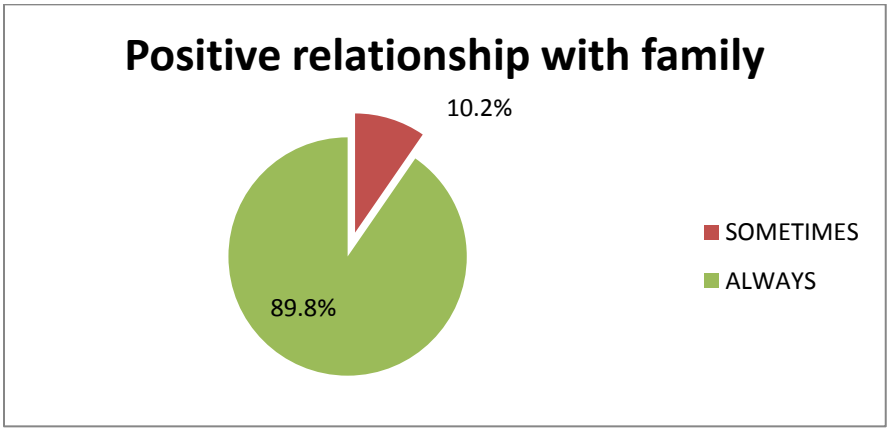

Figure 5.8: Frequency of relationship with family being perceived as positive and caring

The entire population describes the relationship with their families as always being positive and caring; with 89.8% confirming that this is always true. The remaining 10.2% admit that their relationship with their families is positive and caring, but not all the time. Remarkably not a single firefighter reported that they do not have positive and caring relationships with their families.

The level of support available at home is evaluated by the following:

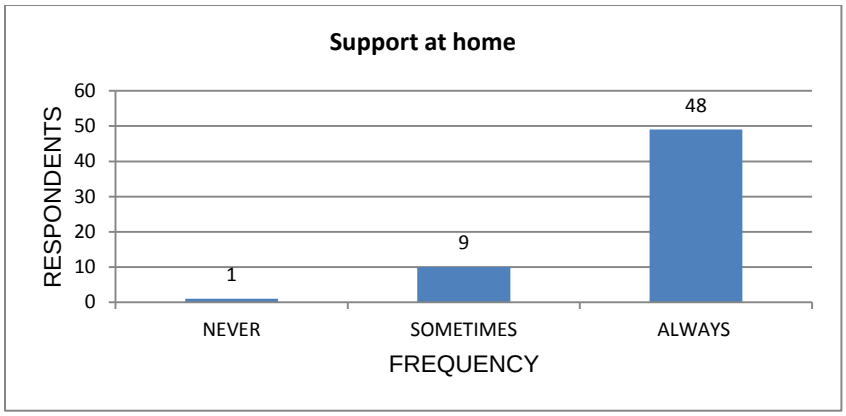

Figure 5:9 Frequency of appreciation and affection being shown at home

Families which is characterized by appreciation and affection is how 98.3% of the respondents described their families, although 15.5% of them admit that their families sometimes show appreciation and affection and only one individual declares that his/her family never shows appreciation and affection. However, this individual perceives the communication within his family is always positive and they do share a sense of belonging, beliefs and morals with his family.

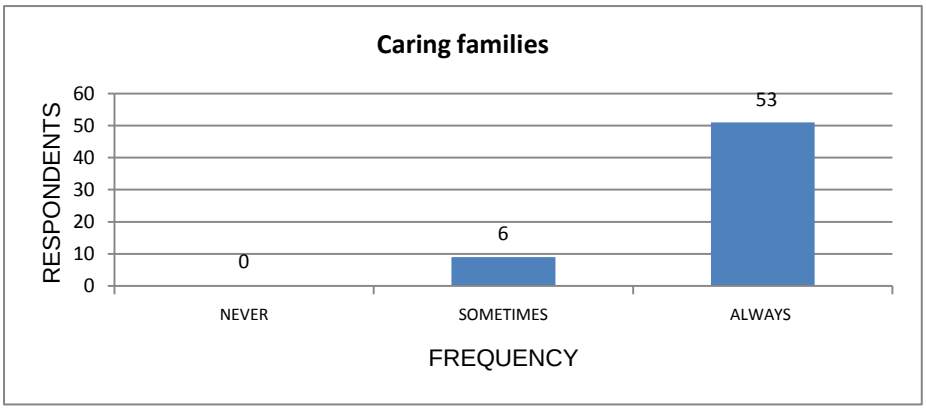

Figure 5.10: Frequency of families showing love, care, concern and interest for each other

As can be concluded from table 5.10 all the respondents indicated that their family members show love, care, concern and interest for each other, although 10% admit that this is sometimes shown but not all the time. No respondent indicated that their families never show love, care, concern and interest for each other.

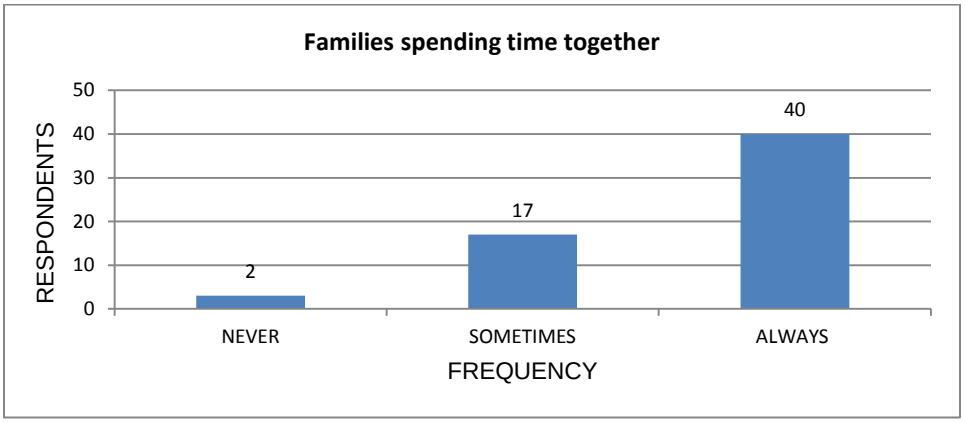

Figure 5.11: Frequency of families enjoying spending time together

Enjoying times together as a family is experienced by 95% of the population of which 67% state that this always occurs and 28% who confirms that this occurs sometimes. The remaining 5% of participants report that they never enjoy time with their families. Spending time together includes recreational activities such as camping, socializing, playing games, hiking and sports as depicted in table 5.5 below.

TABLE 5.5 RECREATIONAL ACTIVITIES

	Responses		Percentage of Cases
	N	Percentage	
Camping	18	10.5%	31.0%
Socializing	51	29.8%	87.9%
Playing games	45	26.3%	77.6%
Hiking	5	2.9%	8.6%
Sports	42	24.6%	72.4%
Other:	10	5.8%	17.2%

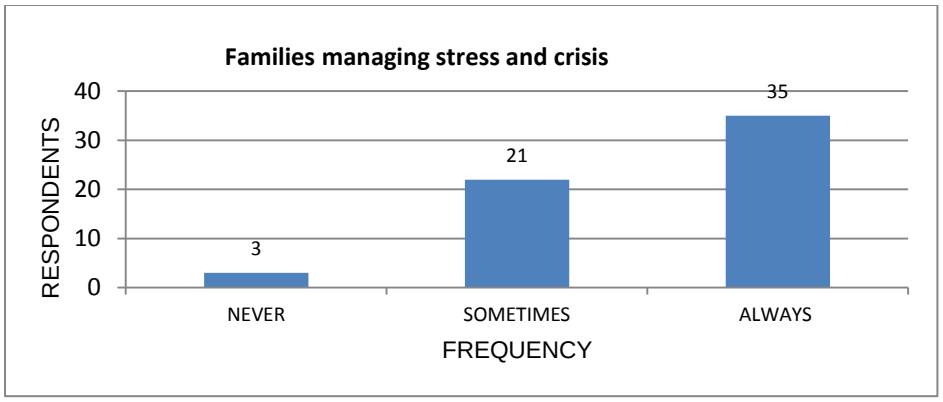

Figure 5.12 Families of firefighters managing stress and crisis effectively

The effective management of stress and crisis within their families is reported by 95% of the population with only three individuals reporting that their families never manage family stress and crisis effectively. One of the three individuals further indicates that communication within his family is not at all positive and they do not share a sense of belonging, beliefs and morals which would collaborate his/her perception that stress and crisis is not managed effectively at home.

TABLE 5.6: COMMUNICATION BEING POSITIVE

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Not at all	1	1.7	1.7	1.7
Sometimes	16	27.1	27.1	28.8
Always	42	71.2	71.2	100.0
Total	59	100.0	100.0	

Table 5.6 indicate that the families of firefighters at King Shaka International Airport display positive communication amongst themselves as stipulated by 69.5% who state that this is always true in their families and 27% who declares this as factual in their families but only sometimes. Only one individual confirms that communication amongst his/her family members is never positive. A correlation is found between positive communication and families sharing a sense of belonging, beliefs and morals as the individual indicating that communication within his family is not at all positive, also indicate that they do not share a sense of belonging, beliefs and morals

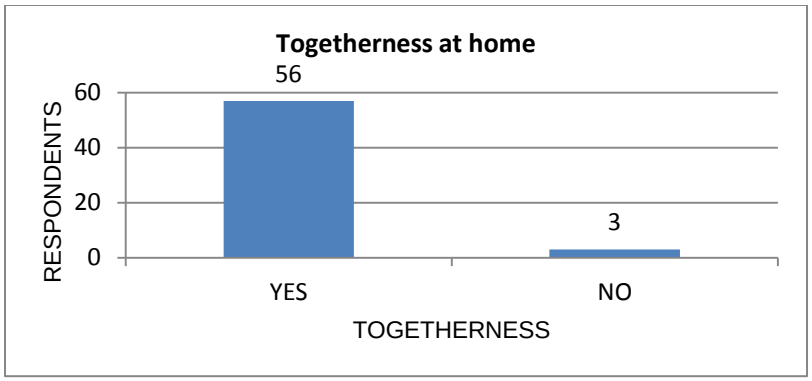

Figure 5.13: sharing a sense of belonging, beliefs, and morals with family members

The overwhelming majority of respondents confirm that they share a sense of belonging, beliefs and morals in their families. In line with the discussion in 2.4.2 a deduction is made that this finding enhances resilience.

Supportive families, which is considered as one of the most important factors related to resilience, has been identified in abundance among the firefighters at King Shaka International Airport, not only at home but also at work. This finding is viewed as a protective factor which will buffer the respondents against the effects of exposure to potentially traumatic events such as aviation disasters.

This question was included to evaluate the degree respect, appreciation and understanding is shown for each other's individuality and uniqueness at home.

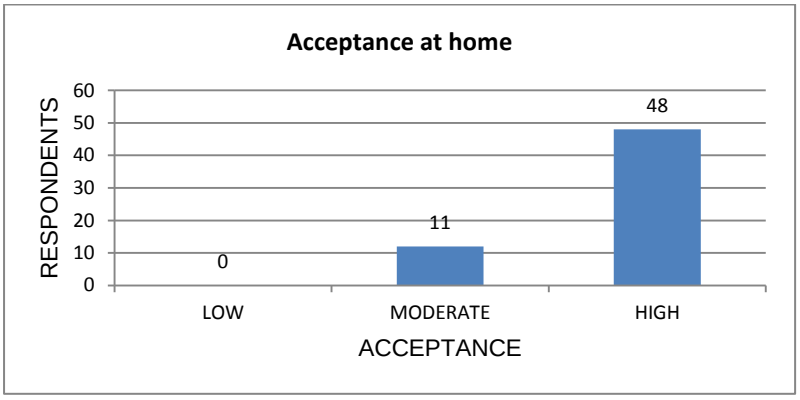

Figure5.14: perceived levels of acceptance at home

The degree respect, appreciation, and understanding is shown for each other's individuality and uniqueness is found to be high as perceived by 81.4% of the population indicating the levels of their acceptance at home. It is further stated that they value and tolerate each other's differences and allows each other space. This percentage is reduced to 59.3% when describing acceptance at work being high. However, only 8.5% of the participants do not share the same sentiment and perceive their levels of acceptance at work to be low.

This following question was included to evaluate the degree at which firefighters at King Shaka International Airport can depend on their family at home for emotional support when required.

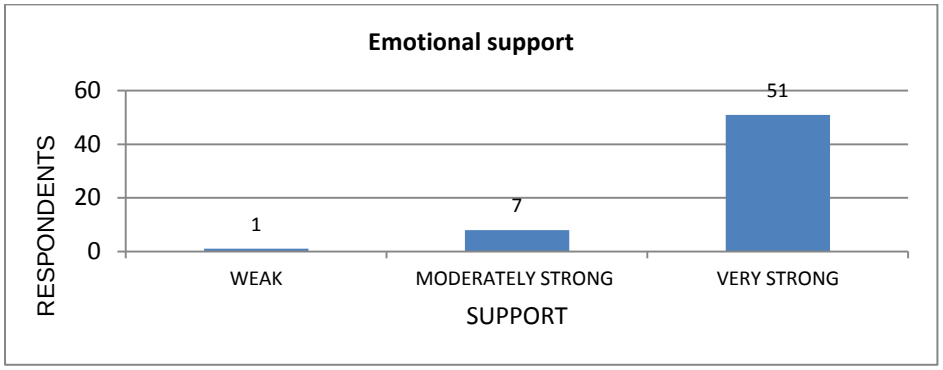

Figure 5:15: Perceived level of emotional support at home

A large percentage of 86.4% of the respondents reports that their families will most definitely assist, encourage, reassure and look out for them other in time of need. This percentage drops to 62% at work, although 32.2% reports that they might receive this support as depicted below. This finding can be ascribed to the fact that the respondents had never been exposed to an aviation disaster and thus have not needed this emotional support.

5.8 EXO LEVEL – THE WORK ENVIRONMENT

Evaluation of the protective strengths in the place of work was conducted as follows.

TABLE 5.7: RESILIENCE COMMENSURATE WITH EXPERIENCE

Years experience	Frequency	Min resilience	Max resilience	Median	Total resilience	Mean
0 -2	34	123	175	145	4936	145.17
3 – 10	12	123	167	154	1807	150.58
11 and more	13	133	168	155	1967	151.31

The above data indicates that 34 (57.6%) of the firefighters at King Shaka international Airport have less than two years of experience in their occupation. Twenty five firefighters (42.4%) have more than two years of experience with 12 (20.3%) having more than 10 years of experience as airport firefighters. These statistics indicate that there is a good balance between junior and experienced firefighters at this airport. The junior staff can thus obtain support from the seniors as the more experienced firefighters were found to be progressively more resilient than the junior firefighters.

The following section seeks to evaluate what level of prior exposure to traumatic events exist amongst the sample, if and what type of emotional support was used and finally, if exposed to this events in future, what type of support should be provided for. This is done in order to formulate recommendations to the employer.

TABLE 5.8: RESILIENCE COMMENSURATE WITH EXPOSURE TO TRAUMATIC EVENTS

	Frequency	Min resilience	Max resilience	Median	Total resilience	Mean
YES	20	124	175	147	3009	150.45
NO	39	123	168	147	5675	145.51
Total	59					

Although no aviation disasters have ever occurred on South African soil resulting in a lack of aerodrome rescue firefighting experience, about 34% of the firefighters at King Shaka International Airport have some exposure to accidents in which people died, but only one firefighter experienced an accident with more than twenty deaths, as depicted in Table 5.10, which is the number at which an accident is considered to be a disaster for the purpose of this study. The firefighters with prior exposure to traumatic events are found to be more resilient than those without exposure. This do not support research findings as discussed in 2.5.4 who found that the sight of dead bodies and grotesque human remains can be overwhelming and can lead to acute and posttraumatic stress disorder.

TABLE 5.9: EMOTIONAL SUPPORT RECEIVED AFTER EXPOSURE TO POTENTIALLY TRAUMATIC EVENTS

		Frequency	Percent	Valid Percent	Cumulative Percent
	Yes	6	10.2	12.5	12.5
	No	42	71.2	87.5	100.0
	Total	48	81.4	100.0	
Missing	0	11	18.6		
Total		59	100.0		

Table 5.9 indicate that firefighters generally do not freely seek counselling or other support which can be attributed to the research findings that the stigma attached to firefighters seeking help will make them appear to be weak as discussed in 2.5.1.

TABLE 5.10: FREQUENCIES AND TYPES OF SUPPORT RECEIVED

	Responses		Percent of Cases
	N	Percent	
Professional counseling services	2	10.5%	22.2%
Religious support	2	10.5%	22.2%
Family	4	21.1%	44.4%
Peers	1	5.3%	11.1%
Friends	3	15.8%	33.3%
Employee Assistance Program	1	5.3%	11.1%
Supervisors / Managers at work	3	15.8%	33.3%
None	3	15.8%	33.3%
Total	19	100.0%	211.1%

The few firefighters who did previously make use of support, as depicted in Table 5.10 selected to use support from the family as first choice. It is therefore important to enhance this source of support.

TABLE 5.11: FREQUENCIES OF MOST PREFERRED SOURCES OF SUPPORT

	Responses		
	N	Percent	Percent of Cases
Professional counseling services	39	16.5%	68.4%
Religious support	35	14.8%	61.4%
Traditional healers or rituals	8	3.4%	14.0%
Family	38	16.0%	66.7%
Peers	16	6.8%	28.1%
Friends	27	11.4%	47.4%
Employee Assistance Program	33	13.9%	57.9%
Supervisors / managers at work	33	13.9%	57.9%
None	7	3.0%	12.3%
Other	1	.4%	1.8%
Total	237	100.0%	415.8%

The majority of the sample indicates that, as depicted in table 5.11, when exposed to traumatic events, they want to have access to sources of support with professional counselling services, family, religious entities, the company's Employee Assistance Program and supervisors/managers at work being their choice of this support. It will thus be recommended that access to these four sources be pro-actively provided for in a company procedure.

5.8.1 Training

TABLE 5.12: SKILLS AND COMPETENCIES

	Responses		
	N	Percent	Percent of Cases
Basic Aircraft Construction	54	14.6%	91.5%
Heavy Vehicle Driving	33	8.9%	55.9%
Level 3 First Aid	42	11.4%	71.2%
Intermediate Life Support	9	2.4%	15.3%
Aircraft marshalling	56	15.1%	94.9%
Basic Aircraft Firefighting	54	14.6%	91.5%
Advanced Aircraft Construction	10	2.7%	16.9%
Pump Operator	23	6.2%	39.0%
Basic Life Support	17	4.6%	28.8%
Advanced Life Support	2	.5%	3.4%
Radio Telephony	50	13.5%	84.7%
Advanced Firefighting	9	2.4%	15.3%
Other	11	3.0%	18.6%

It can be concluded that a lack of training is not considered a risk as the firefighters are well trained for the job requirements. In line with discussions in 6.3.4, it can be concluded that training increase personal competence which is viewd as a protective strength. Table 5.13 below further indicate that the majority of firefighters believe that the training they received will serve as protective strength.

TABLE 5.13: DEGREE OF PERCEIVED PROTECTION FROM TRAINING RECEIVED

	Frequency	Percent	Valid Percent	Cumulative Percent
1	2	3.4	3.4	3.4
4	10	16.9	16.9	20.3
5	14	23.7	23.7	44.1
6	16	27.1	27.1	71.2
7	17	28.8	28.8	100.0
Total	59	100.0	100.0	

5.8.2 Social support at work.

This question was included to evaluate the level of perception that they are loved and cared for at work.

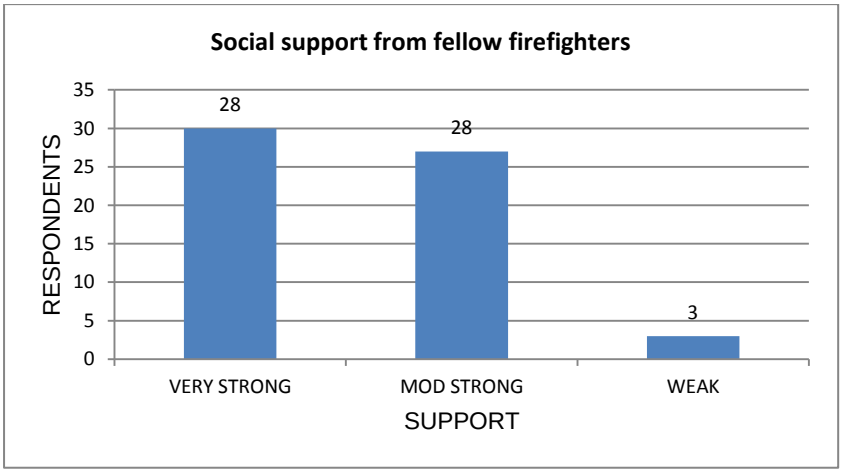

Figure 5.16: Perceived social support from fellow firefighters

The place of work has been found to a valuable source of social support as 56 firefighters (94,9%) confirm that they can depend on social support from their peers. A correlation is found between social support and relationship. Of the three participants who indicated that they their

perceived social support at work is weak, one indicated that his relationship at work is never characterized as being positive and caring whilst two indicated that this characteristic is only experienced sometimes.

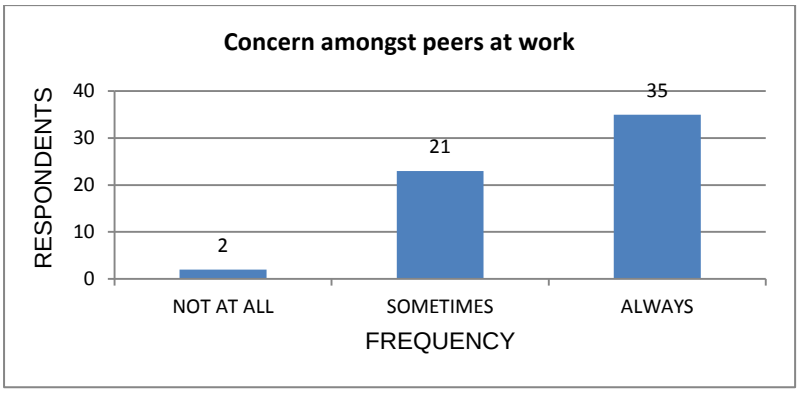

Figure 5.17: Frequency of Love, concern, appreciation, and interest shown for each other at work

Almost all of the respondents (96.6%) of respondents reported that they share and show love, care, concern, appreciation and interest for each other. However, further perusal of these three questionnaires also indicate that 2 individuals report that they have never experienced this and one individual did not respond to this question. One of the two individuals also reports a perception that, at work:

1 They never share and show love, care, concern, appreciation and interest in each other.
2 They are never like a family.
3 Never enjoy times together
4 Never manage stress and crisis effectively.
5 Communication is never positive and a sense of belonging, beliefs and morals is never shared.

This perception could possibly be attributed to the fact that this individual has only ten months employment in the service (as written on his questionnaire), after ten years service with a municipal fire and rescue service. Another individual shares the above perception but do not agree with (2) and (3).

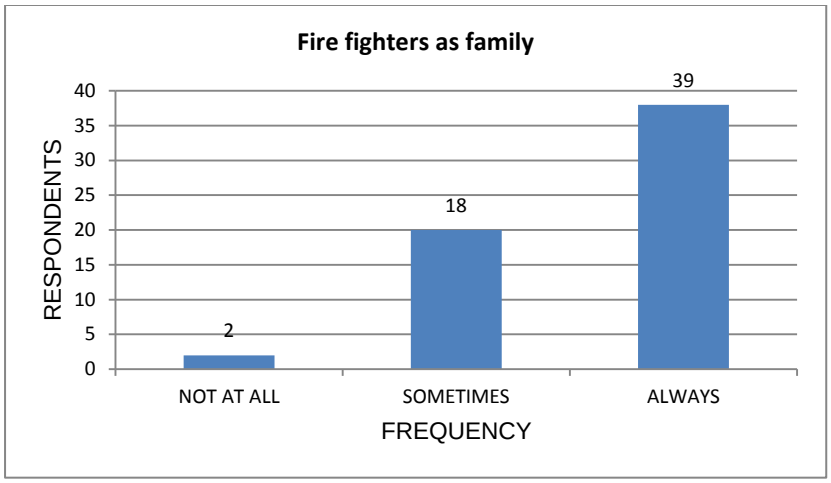

Figure 5.18: The frequency firefighters perceive themselves to be a family

Almost all of the respondents (96.6%) of respondents reported that they are like a family at work. In line with the discussion in 2.4.3 an inference can be made that the firefighters at King Shaka International Airport will support each other when required to do so.

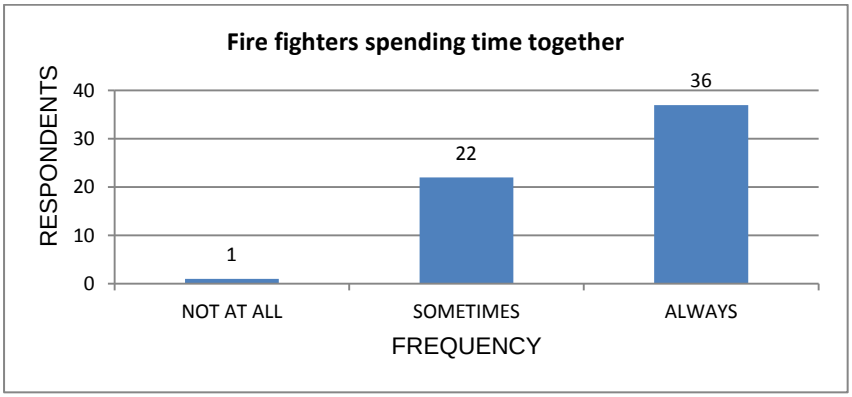

Figure 5.19: The frequency of firefighters enjoying time together

All except one individual reports that they enjoy spending time with their peers in activities such as camping, socializing, playing games, hiking and sports as depicted in Table 5.14 below. A few also indicated that they enjoy training for emergency response preparedness with each other.

TABLE 5.14: RECREATIONAL ACTIVITIES ENJOYED WITH PEERS

	Responses		
	N	Percent	Percent of Cases
Camping	10	7.0%	17.5%
Socializing	46	32.4%	80.7%
Playing games	29	20.4%	50.9%
Hiking	1	.7%	1.8%
Sports	50	35.2%	87.7%
Other:	6	4.2%	10.5%
Total	142	100.0%	249.1%

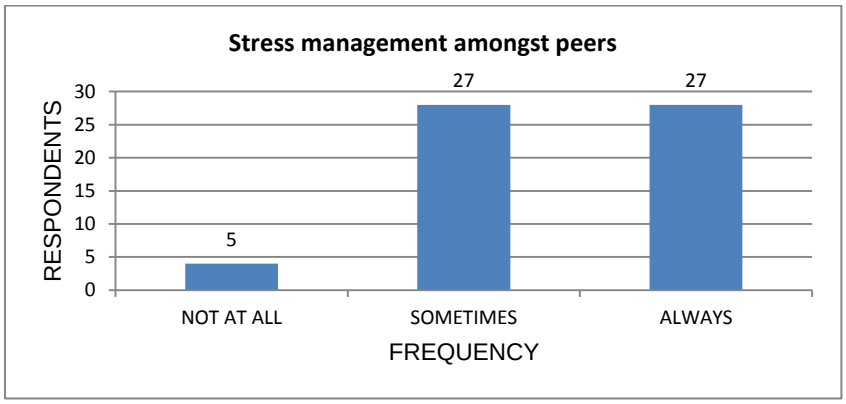

Figure 5.20: The frequency of stress and crisis being managed effectively at work.

The majority (91.5%) of the respondents confirm that stress and crisis is managed effectively amongst themselves, although half of this percentage cautions that this not constantly done.

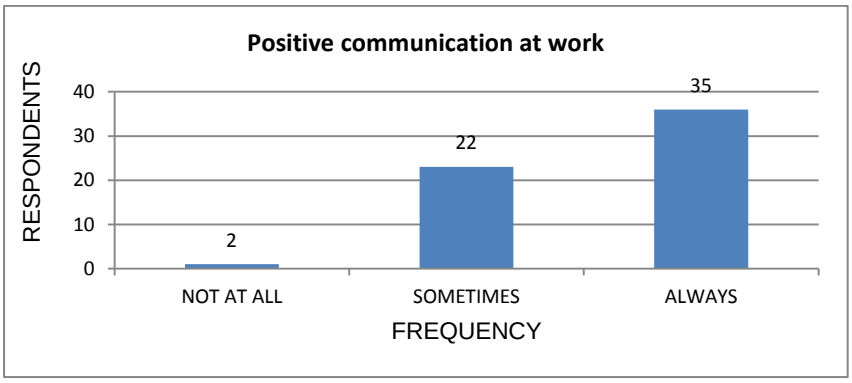

Figure 5.21: The frequency of positive communication at work.

The overwhelming majority (96.6%) of the respondents perceive the communication amongst themselves as being positive. In line with the discussion in 2.4.3 the assertion is made that positive communication serves as protective strength amongst the firefighters at King Shaka International Airport.

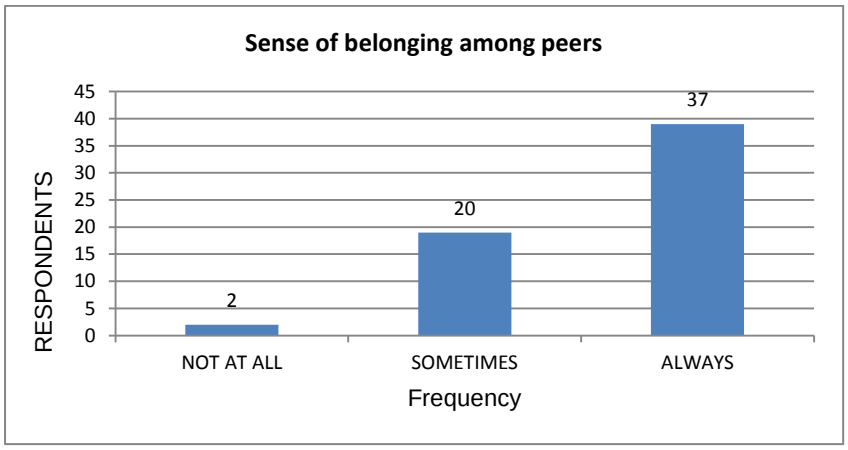

Figure 5.22: The frequency of sharing a sense of belonging, beliefs and morals at work.

The overwhelming majority of the participants (96.6%) state that they share a sense of belonging, beliefs and morals on their respective platoons which enhances the support received at work.

The firefighters at King Shaka international generally view themselves as being more like a family than work colleagues. Showing love, care, concern, appreciation and interest for each other, enjoy being together whilst maintaining positive communication amongst them is how they describe themselves. In addition, they share a sense of belonging, beliefs and morals to further enhance and establish supportive families as one of their protective factors.

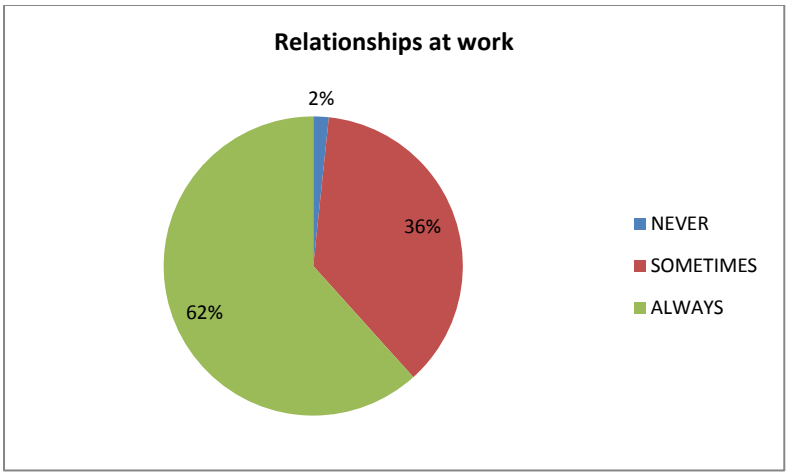

Figure 5.23: Perceived level of positive and caring relationships at work

The overwhelming majority reports that one firefighter reported that the relationships at work are never positive and caring. Converse to this, 98.3% disagree with this perception. In line with the discussion in 2.2.3 an assertion is made that the prevailing relationship amongst the resilience of firefighters at King Shaka International Airport enhances their resilience.

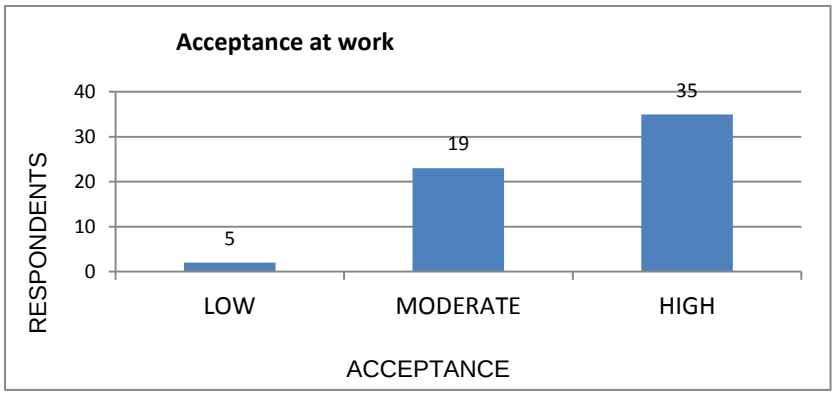

Figure 5.24: Perceived level of acceptance at work

Being accepted as an integral part of any emergency response team is considered important as these individuals performs their functions as a team. The degree of acceptance is found to be high both at home and at work. As protective factor, acceptance as a member of the team ensures support in difficult times. As a result of the discussion in 2.4.3.1, the deduction is made that most participants in this study feels accepted within the team which serve as protective factor.

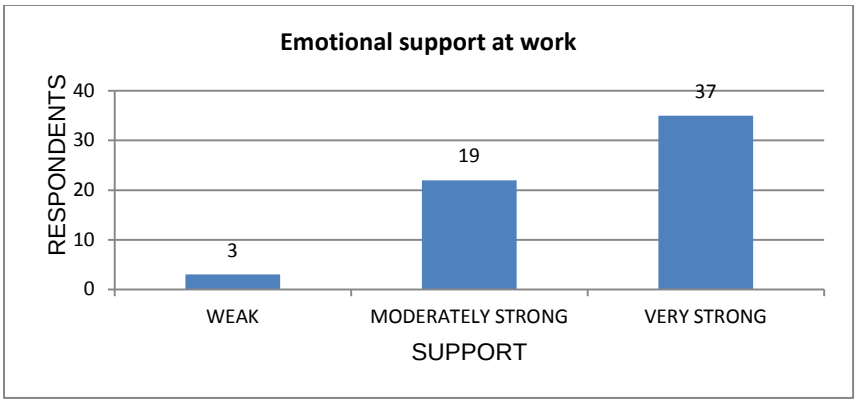

Figure 5.25: Degree of emotional support at work

5.8.3 Level of commitment.

Exposure to the gruesomeness of aviation disasters associated with gruesomeness can potentially challenge the effective outcome of firefighting and rescue efforts. An evaluation is therefore conducted to determine the level of commitment the research population have to each other and to their job in order to make an informed prediction of their dedication and loyalty.

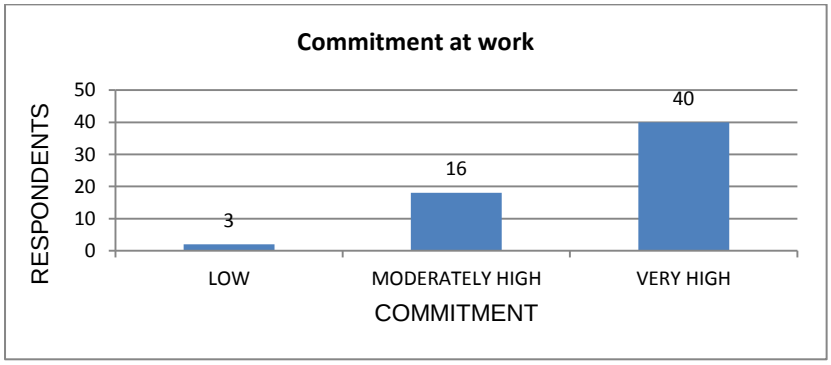

Figure 5.26: Degree of perceived commitment at work

A high level of commitment is measured as 67.8% of firefighters at King Shaka International Airport reports that they are totally dedicated and loyal to each other, whilst 27.1% rate the commitment levels amongst themselves as moderate. It is noted that only three individuals expressed concern w.r.t the level of commitment at work.

5.9 MENTAL HARDINESS OF THE SAMPLE

This section was included to evaluate the level of mental hardiness amongst the firefighters at King Shaka International airport due to the finding that this characteristic of resilience is

considered as being one of the most relevant characteristics to this study. The evaluation of mental hardiness/toughness provides an indication of the level of commitment, control and challenge amongst the respondents.

5.9.1 COMMITMENT

The hardiness characteristic of commitment was evaluated by means of items 1, 4, 7,10 and 13 of the Dispositional Resilience Scale (DRS) attached as Addendum G

TABLE 5.15: "MOST OF MY LIFE GETS SPENT DOING THINGS THAT ARE MEANINGFUL"

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
A little true	7	11.9	11.9	11.9
Quite true	34	57.6	57.6	69.5
Completely true	18	30.5	30.5	100.0
Total	59	100.0	100.0	

From the data in Table 5.15 it can be concluded that the majority of respondents (88%) view their job is meaningful with only 1 respondent (Table 5.48 below), indicating that his/her life is perceived as being without meaning.

TABLE 5.16: "I FEEL THAT MY LIFE IS SOMEWHAT EMPTY OF MEANING"

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Not at all true	52	88.1	88.1	88.1
A little true	3	5.1	5.1	93.2
Quite true	3	5.1	5.1	98.3
Completely true	1	1.7	1.7	100.0
Total	59	100.0	100.0	

TABLE 5.17: "I REALLY LOOK FORWARD TO MY WORK ACTIVITIES"

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
A little true	2	3.4	3.4	3.4
Quite true	16	27.1	27.1	30.5
Completely true	41	69.5	69.5	100.0
Total	59	100.0	100.0	

Almost all (96,6%) of the respondents love their chosen careers as aerodrome rescue firefighters which could potentially expose them to the gruesomeness of potential aviation disasters.

TABLE 5.18: "MOST DAYS, LIFE IS REALLY INTERESTING AND EXCITING FOR ME"

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Not at all true	1	1.7	1.7	1.7
A little true	8	13.6	13.6	15.3
Quite true	23	39.0	39.0	54.2
Completely true	27	45.8	45.8	100.0
Total	59	100.0	100.0	

The high level of commitment to their jobs and careers as aerodrome rescue firefighters is enhanced by the fact that nearly all of the respondents are excited about this job and only 5% of the participants view their lives as generally being boring.

TABLE 5.19: "LIFE IN GENERAL IS BORING FOR ME"

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Not at all true	49	83.1	83.1	83.1
A little true	6	10.2	10.2	93.2
Quite true	1	1.7	1.7	94.9
Completely true	3	5.1	5.1	100.0
Total	59	100.0	100.0	

Integration of the data in Tables 5.17 to 5.21 indicate that that there is a high level of commitment to each other and the job amongst the firefighters at King Shaka International Airport which indicate that the potential to protect and support one another when exposed to aviation disasters is high.

5.9.2 CONTROL

The hardiness characteristic of control was evaluated by items 2, 6, 8, 12 and 13 of the standardised Dispositional Resilience Scale attached as Addendum G

TABLE 5.20: "BY WORKING HARD YOU CAN NEARLY ALWAYS ACHIEVE YOUR GOALS"

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Not at all true	1	1.7	1.7	1.7
A little true	3	5.1	5.1	6.8
Quite true	14	23.7	23.7	30.5
Completely true	41	69.5	69.5	100.0
Total	59	100.0	100.0	

The majority of the respondents believe that by working hard they will achieve positive results when called upon to respond to aviation disasters.

TABLE 5.21: "HOW THINGS GO IN MY LIFE DEPENDS ON MY OWN ACTIONS"

	Frequency	Percent	Valid Percent	Cumulative Percent
A little true	2	3.4	3.4	3.4
Quite true	18	30.5	30.5	33.9
Completely true	39	66.1	66.1	100.0
Total	59	100.0	100.0	

Personal contribution that will determine the outcome of the rescue and fire fighting attempts at potentially traumatic events is understood by the overwhelming majority of the research population. Only 3.4% do not fully comprehend this statement. This finding is also relevant to the influence of self on the future as depicted in Tables 5.22 and Table 5.24 below

TABLE 5.22: "I DON'T THINK THERE IS MUCH I CAN DO TO INFLUENCE MY OWN FUTURE"

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Not at all true	46	78.0	78.0	78.0
A little true	6	10.2	10.2	88.1
Quite true	5	8.5	8.5	96.6
Completely true	2	3.4	3.4	100.0
Total	59	100.0	100.0	

TABLE 5.23: "IT IS UP TO ME TO DECIDE HOW THE REST OF MY LIFE WILL BE".

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Not at all true	4	6.8	6.8	6.8
A little true	3	5.1	5.1	11.9
Quite true	14	23.7	23.7	35.6
Completely true	38	64.4	64.4	100.0
Total	59	100.0	100.0	

TABLE 5.24: "MY CHOICES MAKE A REAL DIFFERENCE IN HOW THINGS TURN OUT IN THE END"

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Not at all true	1	1.7	1.7	1.7
A little true	5	8.5	8.5	10.2
Quite true	20	33.9	33.9	44.1
Completely true	33	55.9	55.9	100.0
Total	59	100.0	100.0	

Almost 90% of the respondents acknowledge that their ability to make the right choices, such as those taught during emergency response training, will determine the outcome of rescue and fire fighting activities.

5.9.3 CHALLENGE

The hardiness characteristic of challenge, the ability to adapt and accept change, was evaluated by items 3, 5, 9, 11 and 14 of the Dispositional Resilience Scale attached as Addendum G

TABLE 5.25: "I DON'T LIKE TO MAKE CHANGES IN MY REGULAR ACTIVITIES"

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Not at all true	21	35.6	35.6	35.6
A little true	23	39.0	39.0	74.6
Quite true	11	18.6	18.6	93.2
Completely true	4	6.8	6.8	100.0
Total	59	100.0	100.0	

A low total of 35.6% of the respondents indicate that they do not like to make changes in their regular activities. This finding is a point of concern as rescue and firefighters must be able to adopt to changes as no single disaster scene is identical. The fact that the question was

negatively framed is perceived to be the reason for this result. Question five (Table 5.26) below justifies this perception as 98.3% indicate that changes in routine are interesting.

TABLE 5.26: "CHANGES IN ROUTINE ARE INTERESTING TO ME"

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Not at all true	1	1.7	1.7	1.7
A little true	13	22.0	22.0	23.7
Quite true	26	44.1	44.1	67.8
Completely true	19	32.2	32.2	100.0
Total	59	100.0	100.0	

TABLE 5.27: "I ENJOY THE CHALLENGE WHEN I HAVE TO DO MORE THAN ONE THING AT A TIME"

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Not at all true	2	3.4	3.4	3.4
A little true	16	27.1	27.1	30.5
Quite true	17	28.8	28.8	59.3
Completely true	24	40.7	40.7	100.0
Total	59	100.0	100.0	

Aerodrome rescue and fire fighting activities involve a number of different variables such as effective response and positing of appliances, creating a survivable atmosphere for surviving passengers, search and rescue and environmental protection. Aerodrome rescue firefighters must therefore be able to do more than one thing at a time. 98.3% of the respondents complies to this requirement and enjoys doing more than one activity at a time.

TABLE 5.28: "IT BOTHERS ME WHEN MY DAILY ROUTINE GETS INTERRUPTED"

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Not at all true	20	33.9	33.9	33.9
A little true	13	22.0	22.0	55.9
Quite true	21	35.6	35.6	91.5
Completely true	5	8.5	8.5	100.0
Total	59	100.0	100.0	

The negatively framed questions 11 and 14 (tables 5.30 and 5.31 respectively) again produced results incongruent with the positively framed questions. The fact that 33.9% of the respondents indicated that they are not bothered when their daily routines are interrupted and only 44.1% indicate that they do not like static schedules can be ascribed to this perception.

TABLE 5.29: "I LIKE HAVING A DAILY SCHEDULE THAT DOESN'T CHANGE VERY MUCH"

	Frequency	Percent	Valid Percent	Cumulative Percent
Not at all true	26	44.1	44.1	44.1
A little true	13	22.0	22.0	66.1
Quite true	16	27.1	27.1	93.2
Completely true	4	6.8	6.8	100.0
Total	59	100.0	100.0	

The level of mental toughness (hardiness) was found to be proportional to the level of resilience. Figure 5.27 indicates that as the level of resilience rise, so do does hardiness and vise-a versa.

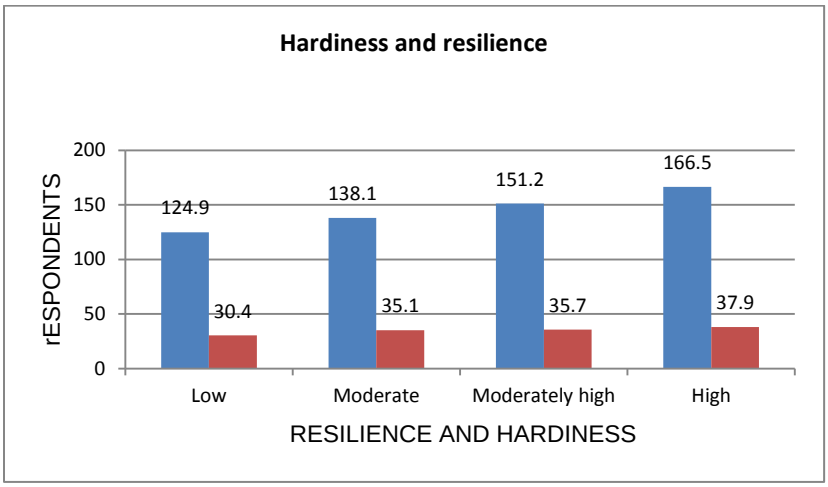

Figure 5.27: perceived levels of resilience and hardiness

The minimum score allocated in the scoring is one and the maximum is four. It can therefore be concluded from the data in Figure 5.27 that the overall levels of hardiness measured in the population is high. The fact that items 3, 4, 11, 13 1nd 14 all measured an average below two is

indicative of the assumption that the respondents found difficulty in answering negatively framed questions.

5.9.4 HARDINESS OF THE SAMPLE.

The results indicate that that there is a high level of commitment to each other and the job amongst the firefighters at King Shaka International Airport. The level of control over their environment is also found to be high and capacity to react positively to any challenge is found to be commensurate to control and commitment. This observation indicates that, when exposed to potentially traumatic events such as aviation disasters, their mental hardiness will act as protective factor.

5.10 RESILIENCE OF THE SAMPLE

The resilience of resilience of aerodrome rescue firefighters at King Shaka International Airport was evaluated according to the five resilient characteristics of self reliance, meaning, equanimity, perseverance and existential aloneness as identified in the standardised Resilience and Scale discussed in 4.2.4.

5.10.1 SELF-RELIANCE

Believing in themselves, with an understanding of their capabilities and limitations is a protective factor identified amongst the target population. This confidence in their own abilities can be ascribed, amongst others, to their continuous regulated training.

TABLE 5.30 "I USUALLY MANAGE ONE WAY OR ANOTHER"

	Frequency	Percent	Valid Percent	Cumulative Percent
1	1	1.7	1.7	1.7
2	3	5.1	5.1	6.8
4	5	8.5	8.5	15.3
5	9	15.3	15.3	30.5
6	23	39.0	39.0	69.5
7	18	30.5	30.5	100.0
Total	59	100.0	100.0	

From this finding it can be deduced that, when exposed to traumatic events, if required, almost 85% of the respondents will be able to manage by themselves due to their self-reliance and belief in themselves.

TABLE 5.31 "I FEEL THAT I CAN HANDLE MANY THINGS AT A TIME"

	Frequency	Percent	Valid Percent	Cumulative Percent
1	1	1.7	1.7	1.7
2	2	3.4	3.4	5.1
3	2	3.4	3.4	8.5
4	7	11.9	11.9	20.3
5	6	10.2	10.2	30.5
6	15	25.4	25.4	55.9
7	26	44.1	44.1	100.0
Total	59	100.0	100.0	

Dealing with the many aspects of aviation disasters is not considered to be a risk factor as 85% of the respondents indicated that they can handle many things at a time.

TABLE 5.32: "I CAN GET THROUGH DIFFICULT TIMES BECAUSE I'VE EXPERIENCED DIFFICULTY BEFORE"

	Frequency	Percent	Valid Percent	Cumulative Percent
1	4	6.8	6.8	6.8
2	3	5.1	5.1	11.9
4	3	5.1	5.1	16.9
5	10	16.9	16.9	33.9
6	14	23.7	23.7	57.6
7	25	42.4	42.4	100.0
Total	59	100.0	100.0	

Exposure to potentially traumatic events is not indicated as a risk factor due to more than 88% of the respondents having previously been exposed to difficulty indicating to them that have and will get through difficult times.

TABLE 5.33: "IN AN EMERGENCY, I'M SOMEONE PEOPLE CAN GENERALLY RELY UPON"

	Frequency	Percent	Valid Percent	Cumulative Percent
6	20	33.9	33.9	33.9
7	39	66.1	66.1	100.0
Total	59	100.0	100.0	

One of the strongest protective factors for firefighters are this finding which indicate that, during aviation disasters, 100% of the respondents can be relied upon to work as a team and support to each other.

TABLE 5.34: "WHEN I'M IN A DIFFICULT SITUATION, I CAN USUALLY FIND MY WAY OUT OF IT"

	Frequency	Percent	Valid Percent	Cumulative Percent
2	1	1.7	1.7	1.7
4	3	5.1	5.1	6.8
5	9	15.3	15.3	22.0
6	20	33.9	33.9	55.9
7	26	44.1	44.1	100.0
Total	59	100.0	100.0	

The overwhelming majority of the firefighters at King Shaka International Airport, when in difficult situations, are able to consider alternatives and find their way out of it.

TABLE 5.35: SELF RELIANCE

N	Minimum	Maximum	Mean	Std. Deviation
59	22.00	35.00	29.8644	3.63630

Amongst the 59 participants the lowest score achieved for self-reliance was 22 and the highest was 35, which is the maximum available per characteristics. An average (mean) of 29.86 was achieved with a standard deviation of 3.64. From this it can e concluded that the level of self reliance is high amongst the research population and that the variances amongst the respondents is minimal.

5.10.2 MEANING

Having a sense of own meaning or purpose in life, an important characteristic of resilience, is found in abundance amongst the firefighters, as tabulated in tables 5.23 to 5.27

TABLE 5.36: "KEEPING INTERESTED IN THINGS IS IMPORTANT TO ME"

		Frequency	Percent	Valid Percent	Cumulative Percent
	1	1	1.7	1.8	1.8
	2	2	3.4	3.5	5.3
	4	3	5.1	5.3	10.5
	5	6	10.2	10.5	21.1
	6	18	30.5	31.6	52.6
	7	27	45.8	47.4	100.0
	Total	57	96.6	100.0	
Missing	0	2	3.4		
Total		59	100.0		

Table 5.36 indicate that overwhelming majority of firefighters at King Shaka International Airport can remain focussed on the job at hand for long periods of time. The relevance of this finding is that most aviation disasters result in emergency responders working for many hours, even days at the same incident.

TABLE 5.37: "I FEEL PROUD THAT I HAVE ACCOMPLISHED THINGS IN MY LIFE"

	Frequency	Percent	Valid Percent	Cumulative Percent
4	2	3.4	3.4	3.4
5	2	3.4	3.4	6.8
6	10	16.9	16.9	23.7
7	45	76.3	76.3	100.0
Total	59	100.0	100.0	

No less than of 93% of the responders indicated that they view successful outcomes of activities as an achievement. They therefore will give of their best in order to achieve these desired results and thereby collectively will enhance their effectiveness.

TABLE 5.38: "I SELDOM WONDER WHAT THE POINT OF IT ALL IS"

		Frequency	Percent	Valid Percent	Cumulative Percent
	1	5	8.5	8.6	8.6
	2	8	13.6	13.8	22.4
	3	7	11.9	12.1	34.5
	4	11	18.6	19.0	53.4
	5	10	16.9	17.2	70.7
	6	12	20.3	20.7	91.4
	7	5	8.5	8.6	100.0
	Total	58	98.3	100.0	
Missing	0	1	1.7		
Total		59	100.0		

The fairly even distribution of the achieved results for question 11, as depicted in table 5.40, indicate possible vagueness of the question in the standardised scale. No meaningful deduction could therefore be made from this data.

TABLE 5.39: "I KEEP INTERESTED IN THINGS"

	Frequency	Percent	Valid Percent	Cumulative Percent
3	1	1.7	1.7	1.7
4	2	3.4	3.4	5.1
5	5	8.5	8.5	13.6
6	21	35.6	35.6	49.2
7	30	50.8	50.8	100.0
Total	59	100.0	100.0	

Table 5.39, similarly to Table 5.8, indicate that the overwhelming majority of firefighters at King Shaka International Airport can remain focussed on the job at hand for long periods of time. The relevance of this finding is that most aviation disasters result in emergency responders working for many hours, even days at the same incident and the firefighters therefore needs to be able to remain focussed for extended periods.

TABLE 5.40: "MY LIFE HAS MEANING"

	Frequency	Percent	Valid Percent	Cumulative Percent
4	2	3.4	3.4	3.4
5	2	3.4	3.4	6.8
6	11	18.6	18.6	25.4
7	44	74.6	74.6	100.0
Total	59	100.0	100.0	

No less than 93.2% of the respondents view their lives as being meaningful which indicate satisfaction and fulfilment in their jobs.

Amongst the 59 participants the lowest score achieved for self-reliance was 22 and the highest was 35, which is the maximum available per characteristics. An average (mean) of 29.86 was achieved with a standard deviation of 3.64. From this it can be concluded that the level of self reliance is high amongst the research population and that the variances amongst the respondents is minimal. A sense of belief in self with a clear understanding of their capabilities and limitations prevail at this airport.

5.10.3 EQUANIMITY

A high level of equanimity is measured amongst the target population. From this it can be deduced that they generally understand that life is neither good nor all bad. Being optimistic, even when the situation might be traumatic or stressful, they look out for opportunities. An indication is that they have learnt to draw on their own and other's experiences and wisdom, and to use this to guide their responses. As manifested in humour, firefighters can laugh at themselves and their circumstances. These findings are drawn from tables 5.41 to 5.45 below.

TABLE 5.41: "I USUALLY TAKE THINGS IN STRIDE"

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
	1	2	3.4	3.4	3.4
	3	2	3.4	3.4	6.9
	4	10	16.9	17.2	24.1
	5	14	23.7	24.1	48.3
	6	13	22.0	22.4	70.7
	7	17	28.8	29.3	100.0
	Total	58	98.3	100.0	
Missing	0	1	1.7		
Total		59	100.0		

No definitive deduction can be derived from the responses to question 7 of the Resilience Scale due to the fact that the responses are evenly distributed over the seven allocated scales with no clear majority located at either end of the scale. However, the majority of the participants indicate that they will not be overwhelmed by traumatic events as they can take it in their stride.

TABLE 5.42: "I TAKE THINGS ONE DAY AT A TIME"

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
1	4	6.8	6.8	6.8
2	1	1.7	1.7	8.5
3	3	5.1	5.1	13.6
4	6	10.2	10.2	23.7
5	8	13.6	13.6	37.3
6	18	30.5	30.5	67.8
7	19	32.2	32.2	100.0
Total	59	100.0	100.0	

The majority (76.3%) of the respondents indicate that, while they are anticipating their first aviation disaster they are not overly anxious but rather take things one day at a time

TABLE 5.43: "I CAN USUALLY FIND SOMETHING TO LAUGH ABOUT"

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
1	1	1.7	1.7	1.7
2	5	8.5	8.5	10.2
3	2	3.4	3.4	13.6
4	9	15.3	15.3	28.8
5	9	15.3	15.3	44.1
6	10	16.9	16.9	61.0
7	23	39.0	39.0	100.0
Total	59	100.0	100.0	

Humour as defence mechanism against the onset of posttraumatic stress syndrome or other mental manifestations of stressful exposure is prevalent amongst the research population as 71.9% indicate that they can easily laugh about issues.

TABLE 5.44: "I CAN USUALLY LOOK AT A SITUATION IN A NUMBER OF WAYS".

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
1	1	1.7	1.7	1.7
3	1	1.7	1.7	3.4
4	2	3.4	3.4	6.8
5	8	13.6	13.6	20.3
6	29	49.2	49.2	69.5
7	18	30.5	30.5	100.0
Total	59	100.0	100.0	

Identifying alternatives in difficult situations is easily achieved amongst the respondents as more than 93% of them indicate that they can usually look at a situation in a number of ways, as depicted in table 5.76. Failure to do so can potentially result in stress when rescue and firefighting activities do not yield the desired result.

TABLE 5.45: "I USUALLY DO NOT DWELL ON THINGS THAT I CAN'T DO ANYTHING ABOUT"

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
1	3	5.1	5.1	5.1
2	4	6.8	6.8	11.9
3	3	5.1	5.1	16.9
4	4	6.8	6.8	23.7
5	10	16.9	16.9	40.7
6	12	20.3	20.3	61.0
7	23	39.0	39.0	100.0
Total	59	100.0	100.0	

Table 5.45 indicate that 76.3% of the respondents can differentiate between the variables that they have control over, such as ensuring they comply with all company policy and procedures which ultimately result in achieving a safe aviation environment and concentrate less on those variables beyond their control such as pilot competence. Failure to do so can potentially result in the firefighters at King Shaka international Airport constantly being anxious about potential aviation disasters.

Amongst the 59 participants the lowest score achieved for equanimity was 17 and the highest was 35, which is the maximum available per characteristics. An average (mean) of 27.54 was achieved with a standard deviation of 4.07. From this it can e concluded that the level of self reliance is high amongst the research population and that the variances amongst the respondents, although higher than the other characteristics discussed in this section, is small.

5.10.4 PERSEVERANCE

A determination to keep going despite difficulties, discouragement and disappointment is measured amongst the firefighters. In conjunction with the ability to bounce back from adversity, their perseverance enhances the resilience as deduced from tables 5.46 to 5.50 below.

TABLE 5.46: "WHEN I MAKE PLANS, I FOLLOW THROUGH WITH THEM"

	Frequency	Percent	Valid Percent	Cumulative Percent
4	1	1.7	1.7	1.7
5	18	30.5	30.5	32.2
6	21	35.6	35.6	67.8
7	19	32.2	32.2	100.0
Total	59	100.0	100.0	

All except one individual respondent indicate that they are able to follow through with requirements such as adherence to regulations. Table 5.78 indicate that 98.3% of the respondents comply with this characteristic of resilience.

TABLE 5.47: "I AM DETERMINED"

	Frequency	Percent	Valid Percent	Cumulative Percent
1	1	1.7	1.7	1.7
4	2	3.4	3.4	5.1
5	3	5.1	5.1	10.2
6	16	27.1	27.1	37.3
7	37	62.7	62.7	100.0
Total	59	100.0	100.0	

Personal determination to succeed is viewed as one of the most relevant requirements of firefighter resilience due to the finding that firefighting is one of the most traumatic careers. Being determined to succeed against all odds is also required in long term rescue and firefighting activities. If this personal attribute is not present, firefighters might be tempted to give up, without considering alternatives, when rescue or firefighting activities do not immediately yield desired outcomes.

TABLE 5.48: "SELF-DISCIPLINE IS IMPORTANT"

	Frequency	Percent	Valid Percent	Cumulative Percent
4	1	1.7	1.7	1.7
5	4	6.8	6.8	8.5
6	10	16.9	16.9	25.4
7	44	74.6	74.6	100.0
Total	59	100.0	100.0	

Table 5.48 indicate that the overwhelming majority of the aerodrome rescue firefighters is disciplined and therefore usually do the right thing even when not under supervision. Self-discipline in firefighting is relevant to ensure every individual firefighter can be relied upon during rescue and firefighting operations.

TABLE 5.49: "SOMETIMES I MAKE MYSELF DO THINGS WHETHER I WANT OR NOT"

	Frequency	Percent	Valid Percent	Cumulative Percent
1	4	6.8	6.8	6.8
2	2	3.4	3.4	10.2
3	2	3.4	3.4	13.6
4	7	11.9	11.9	25.4
5	10	16.9	16.9	42.4
6	17	28.8	28.8	71.2
7	17	28.8	28.8	100.0
Total	59	100.0	100.0	

Possessing the personal attribute that enable individuals to adapt to change and being able to perform their functions irrespective of their own mental condition is important in firefighters to ensure their effectiveness is not compromised when they are not in a positive frame of mind. Almost 75% of the respondents indicate that they comply with this requirement.

TABLE 5.50: "I HAVE ENOUGH ENERGY TO DO WHAT I HAVE TO DO"

	Frequency	Percent	Valid Percent	Cumulative Percent
5	3	5.1	5.1	5.1
6	19	32.2	32.2	37.3
7	37	62.7	62.7	100.0
Total	59	100.0	100.0	

The findings in table 5.50 reveal that the firefighters at King Shaka International Airport do not lack energy to perform their functions. This finding can be attributed to the findings in the biographical component of the questionnaire regarding self-rated health status, frequency of symptoms of depression and social activities participated in.

Amongst the 59 participants in this study the lowest score achieved for perseverance was 25 and the highest was 35, which is the maximum available per characteristics. An average (mean) of 30.93 was achieved with a standard deviation of 2.63. From this it can e concluded that the level of self reliance is high amongst the research population and that the variances amongst the respondents is minimal.

5.10.5 EXISTENTIAL ALONENESS

Whilst being capable of performing alone when required, the target population indicate that they do not deny the importance of shared experiences, nor do they demean significant and close relationships with others, as supported by tables 5.51 to 5.55

TABLE 5.51: "I AM ABLE TO DEPEND ON MYSELF MORE THAN ANYONE ELSE"

	Frequency	Percent	Valid Percent	Cumulative Percent
2	1	1.7	1.7	1.7
3	1	1.7	1.7	3.4
4	5	8.5	8.5	11.9
5	4	6.8	6.8	18.6
6	17	28.8	28.8	47.5
7	31	52.5	52.5	100.0
Total	59	100.0	100.0	

Table 5.38 indicate that 88% of the respondents are dependable as individuals. When this individual dependability is combined as firefighting teams, it contribute is considered a strength which will serve as protective factor, amongst other strengths already discussed.

TABLE 5.52: "I CAN BE ON MY OWN IF I HAVE TO"

		Frequency	Percent	Valid Percent	Cumulative Percent
	1	3	5.1	5.2	5.2
	4	1	1.7	1.7	6.9
	5	3	5.1	5.2	12.1
	6	14	23.7	24.1	36.2
	7	37	62.7	63.8	100.0
	Total	58	98.3	100.0	
Missing	0	1	1.7		
Total		59	100.0		

Although rescue and firefighting activities is performed as teams, all teams are made up of individuals. It is therefore relevant to determine to capacity to perform as individuals. Table 5.54 indicate that more than 91% of the firefighters at King Shaka International Airport are capable of performing as individuals as well as in teams.

TABLE 5.53: "I AM FRIENDS WITH MYSELF"

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
1	5	8.5	8.5	8.5
2	1	1.7	1.7	10.2
3	1	1.7	1.7	11.9
4	3	5.1	5.1	16.9
5	6	10.2	10.2	27.1
6	7	11.9	11.9	39.0
7	36	61.0	61.0	100.0
Total	59	100.0	100.0	

As can be concluded from Table 5.55, 83% of the respondents are content with themselves, and with what they have achieved.

TABLE 5.54: "MY BELIEF IN MYSELF GETS ME THROUGH HARD TIMES"

	Frequency	Percent	Valid Percent	Cumulative Percent
2	3	5.1	5.1	5.1
3	2	3.4	3.4	8.5
4	3	5.1	5.1	13.6
5	6	10.2	10.2	23.7
6	11	18.6	18.6	42.4
7	34	57.6	57.6	100.0
Total	59	100.0	100.0	

Self-belief as catalyst that enable individuals to successfully deal with adversity is considered a protective strength in aerodrome rescue firefighters as they can potentially be exposed to difficult situations at any time. Table 5.56 indicate that self belief, without discarding other potential sources of support, is prevalent amongst the research population.

TABLE 5.55: "IT'S OK IF THERE ARE PEOPLE WHO DON'T LIKE ME"

	Frequency	Percent	Valid Percent	Cumulative Percent
1	4	6.8	6.8	6.8
2	5	8.5	8.5	15.3
3	3	5.1	5.1	20.3
4	4	6.8	6.8	27.1
5	5	8.5	8.5	35.6
6	11	18.6	18.6	54.2
7	27	45.8	45.8	100.0
Total	59	100.0	100.0	

The rescue and firefighter compliment at King Shaka International Airport is employed from various cultures, religions and cultures. It is therefore acceptable that not every individual will be accepted on the same level as others. Table 5.55 substantiates this assumption as only 77.9 percent, which is amongst the lowest of the attributes of resiliency scores, achieved at this airport.

Amongst the 59 participants the lowest score achieved for existential aloneness was 18 and the highest was 35, which is the maximum available per characteristics. An average (mean) of 29.69 was achieved with a standard deviation of 5.05. From this it can e concluded that the level of existential aloneness is high amongst the research population.

5.10.6 SUMMARY OF MEASURED RESILIENCE

TABLE 5.56: SUMMARY OF MEASURED RESILIENCE

	N	Minimum	Maximum	Mean	Std. Deviation
Self Reliance	59	22.00	35.00	29.8644	3.63630
Meaning	59	18.00	35.00	29.5593	3.81590
Equanimity	59	17.00	35.00	27.5424	4.07398
Perseverance	59	25.00	35.00	30.9322	2.63180
EAloneness	59	18.00	35.00	29.6949	5.05233
RSTotal	59	117.00	175.00	147.5932	14.71935

The overall level of resilience amongst the firefighters at King Shaka International Airport was assessed using the standardised Resilience Scale.

The Resilience Scale results for the total sample reveal a mean of 147.6 which is considered as a high level of resilience. The high level of resilience measured amongst the target population is justified by the finding that the five characteristics of resilience namely self reliance, meaning, equanimity, perseverance and existential aloneness produced a mean of 29,6; 29,9; 27,5; 30,9 and 29,6 respectively, as tabulated in Table 5.56 which is all considered to be a high average. In line with the results to question 24, the firefighters correctly predicted their level of resilience being high.

The results of the empirical study indicate that, after addressing all of the abovementioned variables and more, a high level of resilience is prevalent amongst the firefighters at King Shaka International Airport.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 INTRODUCTION

For the purposes of this study, a literature study was conducted in which the concept of resiliency was explored by describing the protective and risk factors. This was done within a strengths perspective using the ecological system of the individual, family and place of work. The ecological approach was used as conceptual framework because the profession of firefighting exists in the interaction of individual firefighters within a family and who form part of a team of firefighters. As discussed from the onset of this study in 1.2, resilience can be described as an ecological phenomenon, which refers to a network of influences such as family, peer group, school, neighbourhood and society, which may affect individual resilience.

Three levels, namely the individual, family and place of work in an ecological analysis system outlined by 5.5; 5.6 and 5.7 were used as levels of analysis for exploring and describing the resilience of airport firefighters. The resilience of aerodrome rescue firefighters was chosen because the aviation industry is forecast to grow for at least 20 years. Statistically speaking, an increase in flights increases the risk of an aircraft disaster occurring, thus increasing the potential of firefighters being exposed to gruesome scenes, mass fatalities and mutilations.

To supplement the literature study, an empirical investigation was undertaken by means of a questionnaire to gather data for the study, as outlined in Chapter 4 and 5. Through the literature study and empirical investigation, an attempt was made to evaluate the level of resilience amongst the study sample, and to explore the risk and protective factors impacting on this resilience. Conclusions and recommendations based on both the literature and empirical investigations are presented in this chapter.

6.2 RESEARCH PROBLEM, RESEARCH QUESTIONS AND THE AIM OF THE STUDY

In order to formulate the conclusions relating to this study, it is important to refer to the aspects which initially motivated and directed the research. Therefore the research problem, subsequent research questions and the aim of the study are outlined once again to form the basis for holistic formulation.

6.2.1 The research problem

The research problem that directs this study was to perform an evaluation of the risk and protective factors that influence the resiliency of airport firefighters at King Shaka International Airport, and the implications thereof for their disaster preparedness.

6.2.2 The research questions

Given the research problem, the following research questions gave direction to the investigation:

- What are the protective factors which contribute to airport firefighters' resiliency in the work place?
- What are the risk factors of the individual, family and place of work which give rise to challenges for airport firefighters' resiliency at work?
- Which actions by the employer could potentially result in building and enhancing the resiliency of airport firefighters in the work place?

6.2.3 Aim of the study

The aim of the study was to engage in an exploratory and descriptive investigation into the protective and risk factors of airport firefighters to the impact of exposure to mass fatalities, mutilation, grotesque burn and other injuries and suffering. The purpose being that guidelines for the formulation of scientifically founded, pro-active programmes may be formulated to enhance strengths, and build resiliency. The ultimate goal is to ensure preparedness of airport

firefighters. Based on the stated research problem, research questions and the aim of the study, the following conclusions were formulated.

6.3 CONCLUSIONS

The results presented in Chapter 5 demonstrate that firefighters, one of the most traumatic professions, have several protective factors that buffer them against impact of exposure to mass fatalities, mutilation, grotesque burn and other injuries and suffering. The regulated environment in which aerodrome rescue firefighters perform their function was found to be a protective strength as it minimised the potential risk of aircraft accidents occurring.

The use of the Progression to Safety component of the Pressure and Release model in a South African context, further demonstrates how the aviation industry in South Africa, with the South African Civil Aviation Authority as regulator, has an excellent safety record with no aviation disasters ever having occurred in this country. A number of conclusions are formulated to establish whether the aim of the study has been achieved.

6.3.1 The ecological perspective as conceptual framework

The ecological approach is of value to the aerodrome rescue and firefighting profession because it establishes a holistic, interactional perspective that has a broader scope than the traditional cause-effect framework that is deduced from the medical model. In practice firefighters occasionally have to perform as individuals, but they generally function as part of a team. Protective factors are identified within an ecological system and the results of the multi-influencing interactional relationships between the individual firefighter, his/her family and the relationship at work.

6.3.2 The strengths perspective

The evaluation of the resiliency of Aerodrome Rescue Firefighting was conducted from a strengths perspective. This perspective was chosen because it was a deviation from a perspective that looked at what was wrong instead of what was right. Personal observation over

approximately 27 years employment in a professional fire and rescue service revealed that very few firefighters developed posttraumatic stress or other mental/psychological impairments after exposure to potentially traumatic events.

6.3.3 Protective factor

Protective factors, such as a supportive family, are circumstances that moderate the effects of risk and enhance the probability of successful outcomes. Firefighting is accepted as a very traumatic and stressful occupation. However, generally protective factors exceed risk factors which can potentially challenge resilience, and protects against adversity.

6.3.4 Achieving research aims and findings

On the basis of the above-mentioned data, it can be concluded that the aim of the research has been achieved. An exploratory and descriptive investigation to evaluate the resiliency of Aerodrome Rescue Firefighters at King Shaka International Airport, was successful.

During the investigation, it clearly emerged that there was a high level of resilience amongst the firefighters at King Shaka International Airport. Maintaining the current compliance to the regulatory environment in which their functions are performed is more desirable than introducing new programmes or initiatives. The research questions were adequately answered because of the following protective factors which contribute to airport firefighters' resiliency in the work place. They can be distinguished at the Micro (individual), the Meso (the family) and the Exo levels (the work environment).

- Micro level – the individual

    - Biographically it was found that young males were generally more resilient than females who were more vulnerable to develop signs and symptoms of posttraumatic stress or other psychological impairments resultant from exposure to potentially traumatic events. The overwhelming majority of the participants were young males.

- Resiliency was found to enhance health. Similarly, individuals who reported their health as good, very good or excellent possessed the corresponding levels of resiliency. None of the participants indicated a poor health status whilst all indicated good, very good and excellent health.
- A stable mental condition was found to be a protective factor as conversely people with frequent levels of depression were found to be less resilient than their counterparts with stable metal conditions. The overwhelming majority of the participants did not frequently demonstrate symptoms of depression.
- The perception of religion as protective factor was found in almost all the participants as all of the participants indicated a perception that religion would serve as protective strength.
- Mental hardiness was found to be a protective factor which would enhance resilience of the target population.
- Positive attitudes, sense of mastery, personal competence, acceptance of self and life, satisfaction with life and the importance attached to spiritual beliefs, were all examples of protective factors identified by the research population.

- Meso level – The family

  - Abundant social and emotional support which included families being supportive; showing love, care and interest for each other; positive communication; enjoying time together and sharing a sense of belonging, beliefs and morals with family members served as protective factor. Firefighters were fortunate to belong to two families, one at home and the other at work, and therefore enjoyed support from both families.
  - Social support from family, friends, fellow firefighters and others was found to be a protective factor.
  - Commensurate with the literature study, healthy relationships at home were identified as one of the strongest protective factors that enhanced resiliency. The overwhelming majority of the participants indicated that the relationship with family members was positive and caring.

- Exo level - The working environment

  - Although it can also be a risk factor, prior exposure to potentially traumatic events can serve as protective factor especially when the previous exposure was effectively managed and lessons were learnt from this. Similarly, experience and regular training builds confidence which act as protective factor.
  - Commitment to each other and their jobs as firefighters was found to be a protective factor. All the participants indicated that commitment to each other was assured as they shared the good times and the bad. In difficult times, they could rely on one another.
  - Supervisor and co-worker support during and after exposure to potentially traumatic events as protective factor was identified.
  - The regulated environment in which aerodrome rescue firefighters performed their functions was identified as a protective factor. Compliance with it substantially reduced the risk of potential traumatic aviation disasters occurring, by addressing root causes of aircraft accidents and enhancing a safe aviation environment.
  - Commensurate with the literature study, a healthy relationship at home was identified as one of the strongest protective factors that enhanced resiliency. The overwhelming majority of the participants indicated that their relationships at work were positive and caring.

6.3.4.1 Risk factors challenging airport firefighters' resiliency

In various studies firefighters working with victims have been found to be at risk for posttraumatic stress symptoms and other emotional disorders. The following risk factors, which give rise to challenges for resiliency of aerodrome rescue firefighters, can be distinguished:

- Severity of the disaster. Aviation disasters are associated with multiple deaths, multiple fractures and severed limbs and severe suffering. In addition severe heat can be present resultant of the amount of fuel carried onboard commercial aircraft and the effect on the environment.
- Cause of the disaster. Whilst the severity of the aviation disaster will be accepted, the fact that criminal activity or human error might have contributed to the disaster

might potentially be a risk as it might impact on the emotional stability of the firefighters.

- Stigmatisation. Firefighters are generally perceived as protectors of the flying public. Should they fail to prevent deaths and suffering occurring, a risk of them viewing themselves as inadequate might result.
- Risk factors identified at work include prior exposure, career choice, exposure to death, extreme fatigue, and frustration at being unable to fulfil disaster roles, level of exposure and a lack of preparation for disasters.

6.4 Actions by employer in building resiliency

Prior to the emergence of the strengths perspective, this study would probably have resulted in recommendations of external support and intervention systems being made compulsory. However, commensurate with the findings of this study, it is recommended that the exposed, affected firefighters be encouraged to tap into their own coping resources before intervention is considered. It is recommended that the following actions by the employer, which could potentially result in building and enhancing the resiliency of airport firefighters in the work place, be distinguished:

- Prior to exposure to potentially traumatic events:

    - The firefighters should be educated about the impact of psychosocial processes on the rescue effort itself and the long-term consequences of not responding to the mental health effects.
    - As part of the daily, weekly, monthly and quarterly programme, compliance with the company's policy and procedure policy should be enforced. This study found that the current excellent aviation safety records in which not a single occurrence of an aviation disaster on South African soil could be found, was partially the result of compliance with the regulated aviation environment.
    - A procedure should be drafted and accepted detailing steps to be taken to provide emotional and physical support to firefighters when exposed to aviation disasters, if requested.

- The results of this study should be made known and used as preparation tool.

- During the exposure to potentially traumatic events:

  - Aerodrome Rescue Firefighting Service management must report to the accident scene to provide emotional and other support and to demonstrate empathy to the firefighters.
  - Senior airport management demonstrate tangible support to the rescue and firefighting environment following critical incidents.
  - The duration of exposure must be limited by the provision of relief teams.
  - Refreshments and protection against the elements made be provided where possible.

- After exposure to potentially traumatic events:

  - A concerted effort must be made to acknowledge good performance.
  - Access to professional or desired sources of support must be provided. The desire of those individuals who desire not to make use of counselling services must be respected.
  - Operational debriefings must be held to identify, record and action lessons learnt from the traumatic event.
  - In addition to providing the desired support to the affected employees, the company must not neglect the needs of the affected families.

By answering the research questions the research problem was highlighted because an evaluation of the risk and protective factors impacting on the resiliency of aerodrome rescue firefighters at King Shaka International Airport was done and it was therefore possible to determine the implications of these factors on their resilience

6.5 RECOMMENDATIONS

The research conducted for this mini dissertation shows that there is a need for a holistic initiative to enhance the available protective strengths. This is needed because it is not possible to eliminate the risk of aviation disasters.

Recommendations made in this study are consistent with and take into account the regulated environment in which aerodrome rescue firefighters perform their function. There is awareness in the South African Government's commitment, as contracting state to the Chicago Convention of 1944, to provide a safe aviation environment. Recommendations are made in a way consistent with the spirit of this commitment, as well as the provisions made in the Disaster Management Act.

6.5.1 Theory

The quest to achieve and maintain an aerodrome rescue and firefighting service that is resilient to the gruesomeness of aviation disasters associated with multiple fatalities, grotesque burn injuries, multiple fractures and mutilations is relevant. It is therefore important that a holistic effort be made to continually enhance all protective factors, including those not explored in this study, within the individual firefighter, his/her family and the place of work. Whilst the gruesomeness of aviation disasters must be acknowledged, it must not overshadow the fact that people do bounce back from adversity and can also demonstrate growth following adversity.

The fire and rescue management, as well as the human resource department, should take note of particular theoretical aspects that emanate from this study. If an aviation disaster should occur at this airport, it should not be automatically assumed that the firefighters will require immediate mandatory psychological intervention. Instead of the aforementioned, immediately following a traumatic event, the affected staff should be given a chance to pull themselves together so that cohesion of the group is enabled to stay intact.

In line with the principles of the strengths perspective, the firefighters should be given the opportunity to take charge of their own recovery by, amongst others, selecting their own support systems. However, as discussed in 2.4.3, they should not perceive their managers as not caring for them. The visibility of senior management is important because it creates a perception that their well-being is cared for. Flowing out from this study, the following should be propagated and further extended:

- Social support to firefighters should become company policy.

- A culture based on the principles of the strengths perspective should be established and maintained. Congratulating staff on achievements, recognition of leadership abilities and empowering staff should be routinely done.

  Access to a copy of this study should be provided to all firefighters at King Shaka International Airport so that a perception can be created within them that they are surrounded by resilient individuals on whom they can depend in traumatic times.

6.5.2 Training

Current aerodrome rescue firefighter training is regulated within the parameters stipulated by the International Civil Aviation Authority to ensure airport firefighters are adequately trained to perform rescue and firefighting duties to provide for the safety of passengers. However, training to prepare firefighters mentally for potential exposure to traumatic events is not structured and is neglected. Training programmes therefore have to be adjusted to incorporate, amongst others, the recognition of signs and symptoms of posttraumatic stress and other psychiatric disorders. In addition, as part of training for aviation disasters, it is recommended that a structured training program be introduced to expose the firefighters at King Shaka International Airport to dead bodies. In conjunction with the state pathology department, the following framework for a two stage approach is recommended:

- **Stage One**
  1. The state pathology department present the firefighters with an introductory lecture on their working environment.

2. A video presentation and pictures showing dead bodies in various stages of deformity be shown.
3. A period to be allowed to observe the effect of this lecture and video presentation has on the firefighter behaviour before commencement with stage two of the training program.

- **Stage Two**
  1. Firefighters to be mentally prepared for exposure to dead bodies.
  2. Firefighters be taken to the state mortuary and exposed to multiple dead bodies.
  3. Firefighters to be exposed to autopsy's being performed.
  4. Firefighters to be observed for any change in behaviour during the visit to the mortuary, as well as afterwards.

It is further recommended that the firefighters be consulted and thoroughly briefed on the need and potential positive and negative outcomes of the envisaged training program. No firefighter should be forced to attend if they indicate a desire not to do so.

Training is also required to empower fire and rescue managers to enable them to support firefighters in order to prevent exposure to traumatic events from manifesting as posttraumatic stress disorder. All rescue and firefighting managers/supervisors should be trained in the strengths perspective in order for a strengths-based culture to be established and maintained at King Shaka International Airport. The heads of department should be trained in motivational skills and empowered to recognise and reward subordinates for empowerment initiatives undertaken.

Training lectures should also be presented from a strengths perspective. Not only should all firefighters be lectured on topics such as the potential severity of injury associated with aircraft accidents, but every available opportunity should also be used to utilise the findings of this study, as well as literature on resilience to continuously remind firefighters that exposure to traumatic events do not automatically culminate in posttraumatic stress disorder or other mental disorders.

6.5.3 Rehearsals

The International Civil Aviation Organisation recommends that a full scale aerodrome emergency exercise shall be conducted at intervals not exceeding two years, and partial exercises in the intervening year to ensure any deficiencies found during the full scale aerodrome emergency exercise, that need to be corrected. It is thus recommended that all firefighters, including those on rest days during the scheduled exercise be encouraged to participate. It is further recommended that the norm of making use of make-up artist to prepare all "passengers" to appear as real as possible patients with burns, fractures and gruesome injuries be continued in order to provide a realistic scenario that can be expected if a commercial aircraft should crash.

In addition, rehearsals must include the call out and response of counsellors to all emergency exercises. This will ensure that firefighters are familiar with the counsellors who might one day arrive at the scene of aviation disasters to support them.

6.5.4 Emergency Plan

Continuous training on the South African Civil Aviation Authority (SACAA) approved Emergency Plan for King Shaka International Airport, which provides for the integrated coordination of the actions to be taken in an emergency occurring at the aerodrome or in its vicinity, must be undertaken to ensure familiarity with the contents of this document. Resultant from this study, it is concluded that emphasis should be placed on the roles and responsibilities of the clergy and other counselling services, incorporated in the plan and, as discussed in 6.3.3. These providers of emotional support must be incorporated in the call-out procedures during emergency exercises to enhance familiarity before an actual aviation disaster occurs. Addressing the physical and emotional needs of first responders should not be overlooked, nor should it be of lesser priority during emergency response.

6.5.5 Policy

The findings of this study emphasise the importance of a holistic approach to the firefighter's mental and physical preparation for disasters. It is thus recommended that the department responsible for the writing of policies and procedures be tasked to compile a

policy on the provision for mental and physical support during and after exposure to traumatic events a company policy.

In addition to the policy, the corresponding procedure, detailing the activities to be carried out by ACSA Fire and Rescue personnel when requesting the services of clergy and other mental support providers must be drafted. The procedure must also detail the methodology to be followed in ensuring all staff and their families are supported. Staff and family social gatherings should be encouraged to enhance the capacity within families as protective strength. In addition it is recommended that team building activities be budgeted for annually and enforced.

During and after attendance at traumatic events, the capacity amongst the firefighters to support peers must not be underestimated. Peer debriefing under guidance of trained individuals, should be encouraged.

6.6 CONCLUDING REMARKS

For the purpose of this study an assessment of the resiliency of airport firefighters at King Shaka International Airport was conducted using an ecological framework from a strengths perspective. The research with regard to the resiliency amongst firefighters at King Shaka International Airport was conducted through a systemic research process, which was performed by the researcher as follows:

The researcher provided an introductory chapter in which the problem statement and motivation of the research were presented. A detailed outline of the research procedures was also provided. Relevant literature was utilised by the researcher to assess the concept of resiliency from a strengths perspective in order to obtain a better understanding of the research domain. The literature analysis was used as the foundation for the empirical investigation, from which specific results were obtained. The results of the research were interpreted and discussed, and conclusions and recommendations were made by the researcher.

The outcome of the research was the finding that the firefighters at King Shaka International Airport have several protective factors at their disposal that would buffer them against the

effects of traumatic exposure. Should a commercial airliner crash at this airport or in its vicinity, the potential gruesomeness of the scene, including multiple fatalities, mutilations, severe burns, decapitations and severed limbs will not compromise the airport's operating licence due to insufficient number of firefighters being available to provide fire and rescue cover due to being emotionally incapacitated.

The identified resiliency factors must be acknowledged and further enhanced by inclusion in training material and lecture content. In addition, the risk factors must also be acknowledged and addressed by constant compliance with regulations to ensure the risk of aircraft accidents occurring be minimised as far as possible.

LIST OF REFERENCES

1. Adams, R. 2003. *Social work and empowerment*. 3rd ed. New York, N.Y: Palgrave Macmillan.

2. Addams, J. 1902. *Democracy and social ethics.* New York, NY: Macmillan.

3. Ahern, N.R. Kiehl, E.M. Sole, M.L., & Byers, J. 2006. A review of instruments measuring resilience. *Issues in Comprehensive Pediatric Nursing,* 29(2): 103-125.

4. Antonovsky, A.1990. Personality and health: Testing the sense of coherence model. *In* H.S. Friedman (Ed). *Personality and Disease:* New York, NY: John Wiley: 155-177

5. Anuradha, K. 2004. Empowering families with mentally ill members: a strengths perspective. *International Journal For The Advancement Of Counselling,* 26(4): 383-391

6. Assis, S.G, Santos, N. Oliveira, R & Carvalhaes, D. 2004 Risk and protection: Looking for an equilibrium that provides resilience. *Psic: Teor. E pesq,* 20(2): 135 – 43.

7. Aviation Safety Network, Fatal airliner hull-loss accidents [Online]. Available from: http://aviation-safety.net. Accessed: [27 June 2011].

8. Babbie, E. 2004. *The practice of social research*. 10th ed. Belmont, MA: Wadsworth/Thomson Learning.

9. Bartone, P.T. 1999. Hardiness protects against war-related stress in army reserve forces. *Consulting Psychology Journal: Practice and Research,* 51(2): 72-82.

10. Beaton, R. & Murphy, S. 1995. Secondary traumatic stress in crisis workers: Research implications. In Figley, C. (Ed.), *Compassion fatigue.* New York, NY: Brunner Mazel: 51-81.

11. Bishop, S. McCullough, B. Thomson, C. & Vasi, N. 2006. Resiliency in the aftermath of repetitious violence in the workplace. *Journal of Workplace Behavioural Health,* 21(3/4): 101-118.

12. Black, C. & Ford—Gilboe, M. 2004. Adolescent mothers: resilience, family health work and health-promoting practices. *Journal of Advanced Nursing,* 48(4): 351-360.

13. Block, J.H & Block, J. 1980. The role of ego-control and ego-resiliency in the organisation of behaviour. In Collins. W.A (ed.) *Development of cognition, affect, and social relations*, Hillsdale, CA: Lawrence Erlbaum Associates.

14. Blum, R.W. McNeely, C. & Nonnemaker, J. 2002. Vulnerability, risk and protection. *Journal of Adolescent Health,* 31(1), Supplement 1.

15. Blundo, R. & Greene, R.R. Survivorship in the face of traumatic events and disasters: implications for social work practice. *In* Greene, R.R. 2007. *Social Work Practice: A Risk and Resiliency Perspective*. Belmont, MA: Thomson Brooks/Cole: 160-174.

16. Boeing Commercial Airplane Group, 2011. *Current market outlook 2011 to 2030*, Boeing, Chicago. [Online]. Available from: http://www.boeing.com Accessed: [1 August 2011].

17. Bonanno, G.A. 2008. Loss, trauma, and human resilience: Have we underestimated the human capacity to thrive after extremely aversive events? *Psychological Trauma: Theory, Research, Practice, and Policy,* 5(1): 101-113.

18. Bonanno, G.A., Rennicke., C. & Dekel, S. 2005. Self enhancement among high exposure survivors of the September 11th terrorist attack: resilience or social maladjustment. *Journal of Personality and Social Psychology,* 88(6): 984-998.

19. Bonanno, G.A., Galea., S, Bucciarelli, A. and Vlahov, D. 2007. What predicts psychological resilience after disaster? The role of demographic, resources, and life stress. *Journal of Consulting and Clinical Psychology,* 75(5): 671-682

20. Bonanno, G.A, Wortman, C.B, Lehman, D. R, Tweed, R.G, Haring, M. & Sonnega, J. 2002. Resilience to loss and chronic grief: a prospective study from pre-loss to 18 months post-loss. *Journal of Personality and Social Psychology,* 83(5): 1150 – 1164.

21. Bonanno, G.A, Moskowitz, J.T, Papa, A. & Folkman, S. 2005. Resilience to loss in bereaved spouses, bereaved parents and bereaved gay men. *Journal of Personality and Social Psychology,* 88(5): 827-843.

22. Braithwaite, G. Aviation rescue and fire fighting in Australia: is it protecting the customer? *Journal of Air Transport Management,* 2(2): 111-118.

23. Brix, C. Schleassner, C., & Fuller, J. 2008. The need for psychological support and its determinants in a sample of patients undergoing radiooncological treatment of cancer. *Journal of Psychosomatic Research,* 65(6): 541-548.

24. Broadhead, W.E., Kaplan, B.H., James, S.A., Wagner, E.H. & Schoenbach, V.J. 1983. The epidemiological evidence for a relationship between social support and health. *American Journal of Epidemiology,* 117(5): 521-537.

25. Bronfenbrenner, U. 1997. *The Ecology of Human Development.* Cambridge, MA: Harvard University Press.

26. Broyles, L.C. 2005. Resilience: Its relationships to forgiveness in older adults. Unpublished doctoral dissertation, University of Tennessee, Knoxville.

27. Button, K. Clarke, A. Palubinskas, G. Stough, R. & Thibault, M. 2004. Conforming with ICAO safety oversight standards. *Journal of Air Transport Management,* 10(4): 251-257.

28. Burns, N. & Grove, S.K. 2001. *The practice of nursing research: conduct, critique and utilisation*. Philadelphia, PA: Saunders

29. Burke, K.J. & Paton, D. 2006. Well-being in protective services personnel: organisational influences. *The Australian Journal of Disaster and Trauma Studies,* (2) ISSN: 1174-4707.

30. Callaghan, P. & Morrissey, J. (1993). Social support and health: A review. *Journal of Advanced Nursing*, 18(2): 203-210.

31. Calhoun, L.G. & Tedeshi, R.G. 2004. The foundations of Posttraumatic Growth: new considerations. *Psychological enquiry,* 15(1): 93-102.

32. Caltabiano, M.L. & Caltabiano, N.L. 2006. Resilience and health outcomes in the elderly. Available at: http://www.aag.asn.au Accessed: [4 February 2011].

33. Canda, E.R. 2002. The significance of spirituality for resilient response to chronic illness: a qualitative study of adults with cystic fibrosis. In Saleebey, D. (ed). *The Strengths Perspective in Social Work Practice,* 3rd ed. Boston, MA: Allyn and Bacon: 106-122.

34. Charney, D.S. 2004. Psychobiological mechanisms of resilience and vulnerability: Implications for successful adaptation to extreme stress. *American Journal of Psychiatry,* 161(1): 195-216.

35. Christopher, K.A. 2006. Determinants of psychological well-being in Irish immigrants. *Western Journal of Nursing Research,* 22(2): 123-143.

36. Cohen, S. & Wills, T.A. 1985. Stress, social support, and the buffering hypothesis. *Psychological Bulletin,* 98(2): 310-357.

37. Coppala, D.P. 2006. *Introduction to international disaster management*. Boston, MA: Elsevier.

38. Corrigan, P. 2004. How stigma interferes with mental health care. *American Psychologist,* 59(7): 614-625.

39. Courneil, W, Beaton, R, Murphy, S, Johnson, C. & Pike, K. 1999. Exposure to traumatic incidents and prevalence of posttraumatic stress symptomatic in urban firefighters in two countries. *Journal of Occupational Health Psychology.* 4(2): 131-141

40. Cowger, C.D. 1994. Assessing client strengths: clinical assessment for client empowerment. *Social Work,* 39(3): 262-268.

41. Cowger, C.D. & Snively, C.A. 2002. Assessing client strengths, individual, family and community empowerment. In Saleebey, D (ed) *The strengths perspective in social work practice.* Boston, MA: Allyn and Bacon: 106 – 121.

42. Cowman, S. Ferrari., J.R. & Liao-Troth, M. 2004. Mediating effects of social support on firefighters' sense of community and perceptions of care. *Journal of Community Psychology,* 32(2): 121-126.

43. Dahlsgaard., K. Peterson, C. & Seligman, M.E.P. 2005. Shared virtue: The convergence of valued human strengths across culture and history. *Review of General Psychology*, 9(3): 203-213

44. de Barros, A.G. & Wirasinghe, S.C. 2002. Designing the airport airside for the new large aircraft. *Journal of Air Transport Management,* 8(2): 121-127

45. De Crespigny, R Richard De Crespigny: Carte Blanche, documentary. Broadcast 19 June 2011

46. De Vos, A.S. Strydom, H. Fouche, C.B. & Delport, C.S.L. 2005. *Research at grass roots: for the social sciences and human service professions*, third edition. Hatfield, Pretoria: Van Schaik.

47. Defrain, J. & Asay, S.M. 2007. Strong families around the world: an introduction to the family strengths perspective. *Marriage and Family Review*, 41(1/2): 1-10.

48. Defrain, J. 1999. Strong families around the world. *Family matters,* 53(Winter): 6-13

49. Delgado, M. 2000. *Community social work practice in an urban context: The potential of a capacity-building enhancement perspective.* New York, NY: Oxford University Press.

50. Dent, R.J. & Cameron, R.J.S. 2003. Developing resilience in children who are in public care: the educational psychology perspective. *Educational Psychology in Practice,* 19(1): 3-9

51. Disaster Mental Health Response Handbook. 2000. NSW. State Health Publication No: (CMH) 00145: ISBN 07347 32139.

52. Donald, D. Lazarus, S, & Lolwana, P. 2002. *Educational Psychology In Social Context 2nd ed.* Cape Town: Oxford University Press.

53. Dougall, A.L. Herberman, H.B. Delahanty, D.L. Inslicht, S.S. & Baum, A. 2000. Similarity of prior trauma exposure as a determinant of chronic stress responding to an airline disaster. *Journal of Consulting and Clinical Psychology*, 68(2): 290-295

54. Epstein, M.H. & Sharma, J.M. 1998. *Behavioural and emotional rating scale: a strength based approach to assessment.* Austen, TX: Pro-Ed.

55. Everly, G.S. 1995. Psychotraumatology. In Everly, G.S., and Lating, F.M. *Psychotraumatology: Key papers and core concepts in posttraumatic stress*. New York, NY: Kluwer Academic/Plenum.

56. Everly Jr, G.S. Sherman, M.F. Stapleton, A. Barnett, D. Hiremath, G.S. & Links, J.M. Workplace crisis intervention: a systematic review of effect sizes. *Journal of Workplace Behavioural Health,* 21(3 & 4): 153-170

57. Ehrenreich, J.H. & McQuaide, S. 2001. *Coping with disasters: A guidebook to psychosocial intervention*. [Online]. Available: http:www.mhwwb.org. [2 February 2009]

58. Feldman, R, Stiffman, A. & Jung, K. (eds). 1987. *Children at risk: In the web of parental mental illness.* New Brunswick, NJ: Rutgers University Press.

59. Figley, C.R. 1995. Systemic PTSD: Family treatment experiences and implications. In Everly, G.S., and Lating, F.M. *Psychotraumatology: Key papers and core concepts in posttraumatic stress*. New York, NY: Kluwer Academic/Plenum.

60. Folke, C. Carpenter, S. Elmqvist, T. Gunderson, L. Holling, C.S. & Walker, B. 2002. Resilience and sustainable development: building adaptive capacity in a world of transformations, *AMBIO: A Journal Of The Human Environment*, 31(5): 437-440.

61. Fraser, M.W. Richman, J.M. & Galinsky, M.J. 1999. Risk, protection, and resilience: toward a conceptual framework for social work practice. *Social Work Research*, 23(3): 129-208.

62. Freedman, T.G. 2004. Voices of 9/11 first responders: patterns of collective resilience. *Clinical Social Work Journal*, 22(4): 377-393.

63. Fredrickson, B.L. Tugade, M.M. Waugh, C.E. & Larkin, G.R. 2003. What good are positive emotions in crisis? A prospective study of resilience and emotions following the terrorist attacks on the United States on September 11th, 2001. *Journal of Personality and Social Psychology,* 84(2): 365-376.

64. Fullerton, C.S. Ursano, R.J. &Wang, L. 2004. Acute stress disorder, posttraumatic stress disorder, and depression in disaster or rescue workers. *American Journal of Psychiatry*, 161(8): 1370-1376.

65. Garmezy, N. & Rutter, M. (eds) 1983. Stress, Coping and Development in Children. Baltimore, MD: John Hopkins University Press.

66. Gibbons, D. & Olk, P.M. 2003. Individual and structural origins of friendship and social position among professionals. *Journal of Personality and Social Psychology,* 84(2): 340-351.

67. Gilligan, R. 1997. Beyond permanence: the importance of resilience in child placement practice and planning. *Adoption and Fostering,* 21(1): 12-20.

68. Gilligan, R. 2001. *Promoting resilience: a resource guide on working with children in the care system.* London: British agencies for adoption and fostering.

69. Glasberg, A.L. Eriksson, S., & Norberg. 2008. Factors associated with "stress of conscience" in health care. *Scandinavian Journal of Caring Science,* 22(2): 249-258.

70. Glicken, M.D. 2004. *Using the strengths perspective in social work practice, a positive approach for the helping professions.* Boston, MA: Pearson.

71. Godshank, D.R. 2003. Urban hazard mitigation: creating resilient cities. *Natural Hazards Review,* 4(3): 136-143.

72. Greene, R.R. 2001 *Resiliency: An Integrated Approach to Practice, policy, and research.* Washington, DC. NASW Press

73. Greene, R.R. 2001. Human behaviour theory: a resilience orientation. In Greene, R.R. (ed) *Resiliency: an integrated approach to practice, policy, and research.* Washington, DC: NASW Press: 63-93

74. Greene, R.R. 2007. *Social work practice: a risk and resiliency perspective*. Belmont, CA: Thomson Brooks/Cole

75. Greene, R.R. & Conrad, A.P. 2001. Basic assumptions and terms. In Greene, R.R. (ed). *Resiliency: An integrated approach to practice, policy, and research*: 63-93. Washington, DC: NASW Press.

76. Greene, R.R, & Livingston, N.C. 2001. A social contract. In Greene, R.R. (ed). *Resiliency: An integrated approach to practice, policy, and research*: Washington, DC: NASW Press: 63-93

77. Gregerson, M.B. 2007. Creativity enhances practitioner's resiliency and effectiveness after a hometown disaster. *Professional Psychology: Research and Practice,* 38(6): 596-602.

78. Hakim, C. 2000. *Research design: successful designs for social and economic research*. London: Routledge.

79. Hannah, S. Sweeney, P.J. & Lester, P.B. 2007. Toward a courageous mindset: the subjective act and experience of courage. *The journal of Positive Psychology,* 2(2):129-135.

80. Hart, P.M. & Cooper, C.L. (2001) Occupational Stress: Toward a more integrated framework. *In* N. Anderson, D.S. Ones, H.K. Sinangil, & C. Viswesvaren (Eds) *International handbook of work and organisational psychology, vol.2: Organisational Psychology.* London, UK: Sage.

81. Hartsough, D. 1988. Traumatic Stress as an Area for Research. *Journal of Traumatic Stress*, 1(2): 145-154.

82. Hatting, S.P, Dreyer, M. & Roos, S. 2004. *Aspects of community health*. 3rd ed. Cape Town, South Africa: Oxford University Press.

83. Hauser, S.T. 1999. Understanding resilient outcomes: Adolescent lives across time and generations. *Journal of Research in Adolescence,* 9(1): 1-24.

84. Heilermann, M.V. Lee,, K.A. & Kury, F.S. 2005. Strength factors among women of Mexican descent. *Western Journal of Nursing Research,* 27(8): 949-965.

85. Heilermann, M.S. Frutos, L. Lee, K.A. & Kury, F.S. 2004. Protective strength factors, resources, and risks in relation to depressive symptoms among childbearing women of Mexican descent. *Health Care for Women International,* 25(1): 88-106.

86. Hepworth, D.H. Rooney, R.H. & Larsen, J.A. 2002. Direct social work practice: theory and skills. Pacific Grove, CA: Brooks/Cole.

87. Higgens, G. 1994. *Resilient adults: overcoming a cruel past.* San Francisco, CA: Jossey-Bass.

88. Hodge, D.R. 2001. Spiritual assessment: a review of major qualitative methods and a new framework for assessing spirituality. *Social Work,* 46(3): 203-214.

89. Hornby, A.S. 2005. *Oxford Advanced Learner's Dictionary of Current English,* seventh edition, Oxford, NY: Oxford University Press.

90. Holling, C.S. 1973. Resilience and stability of ecological systems. *Annual Review of Ecology and Systematics*, 4(November): 1-23

91. Humielski, K.M. & Carr. J.C. 2007. The relationship between entrepreneur psychological capital and well-being. Available at: http://babson.edu/entrep/fer/2007FER/cv_p3.html. [Online] Accessed: [6 July 2011].

92. Humphreys, J. 2003. Research in sheltered battered women. *Issues in Mental health Nursing:* 24(1):137-152).

93. Hunter, A.J. & Chandler, G.E. 1999. Adolescent resilience. *Image: Journal of Nursing Scholarship:* 31(2): 243-247.

94. ICAO, Airport Services Manual: Part 8, Doc 9137-AN/898 Part 8: – Airport Operational Services. International Civil Aviation Organisation, Montreal, 1990.

95. ICAO, *Emergency and Other Services*. Annex 14 to the Convention on International Civil Aviation, 3rd edition, International Civil Aviation Organisation, Montreal, 1999.

96. ICAO, *Airport Services Manual, Part 1 Rescue and Fire Fighting.* 3rd edition, International Civil Aviation Organisation, Montreal, 1990.

97. Jeanette, J.M. & Scoboria, A. 2008. Firefighter preferences regarding post-incident intervention. *Work & Stress.* 22(4), October – December: 314-326.

98. Johnson, B.H., Eid, J., Laberg, J.C. & Thayer, J.F. 2002. The effects of sensitization and coping style on posttraumatic stress symptoms and quality of life: two longitudinal studies. *Scandanavian Journal of Psychology,* 43(2): 181-188.

99. Joseph, S. & Alex Linley, P. 2008. Positive psychological perspectives on posttraumatic stress: an integrative psychosocial framework. In Joseph, S. & Alex Linley, P., *Trauma, recovery, and growth: positive psychological perspectives on posttraumatic stress*: Hoboken, NJ: Wiley: 3-36

100. Judd, C.M., Smith, E.R. & Kidder, L.H. 1991. *Research methods in social relations*. London: Holt, Rinehart and Winston.

101. Kent, M. & Davis, M.C. 2010. The emergence of capacity-building programs and models of resilience. In Reich, J.W, Zautra, A.J. and Hall, J.S.(eds) *Handbook of Adult Resilience.* New York: NY, Guildford: 427-443.

102. King, L.A., King, D.W., Fairbank, J.A., Keane, T.M. & Adams, G.A. 1998. Resilience-recovery factors in posttraumatic stress disorder among female and male Vietnam veterans: hardiness, postwar social support, and additional stressful life events. *Journal of Personalityand Social Psychology,* 7(2): 413-423.

103. Kisthardt, W.E. 2002. The strengths perspective in interpersonal helping. *In* Saleebey, D. (ed) *The Strengths Perspective in Social Work Practice*. 3rd ed. Boston, MA: Allyn and Bacon: 163-185

104. Kirby, L.D. & Fraser, M.W. 2004. Risk and resilience in childhood. In M Fraser (ed) *Risk and Resilience in Childhood*: Washington, DC: NASW Press: 10-33

105. Kisthardt, W.E. 2002. The strengths perspective in interpersonal helping, purpose, principles and functions. In Saleebey, D (ed) *The Strengths Perspective in Social Work Practice.* Boston, MA: Allyn and Bacon: 163 – 183.

106. Koenen, K.C., Stellman, J.M, Stellman S.D. & Sommer, J.F Jr. 2003. Risk factors for course of posttraumatic stress disorder among Vietnam veterans: a 14 year follow-up of American Legionnaires. *Journal of Consulting and Clinical Psychology*, 71(6): 980-986.

107. Klieger, D.M., and Johnson, H.K. 2007. The social phobia and anxiety inventory: problem of underlying medical conditions. *Phychological Reports,* 101(3): 697-706.

108. Kriek, T. & Eloff, I. 2003. *An exploration of the asset-based approach to educational psychology early intervention. MEd thesis.* The asset based approach in educational psychology. Symposium presented at the PsySSA conference. Johannesburg: South Africa, 25 September.

109. Kubie, L. 1971. The destructive potential of humour in psychotherapy. *Amaerican Journal of Psychotherapy,* 172(7): 861-866

110. Lai, S.L. & Lu, W.L. 2005. Impact analysis of September 11 on air travel demand in the USA. *Journal of Air Transport Management,* 11(6): 455-458

111. Landau, S.I. & Bogus, R.J. 1990. *The Bantam Rogets's Thesaurus*. New York: NY. Bantam Books.

112. Lee, J.A.B. 1994. *The empowerment approach to social work practice*. New York, N.Y: Columbia University Press.

113. Leppert, K. Gunzelmann, T. Schumacher, J. Straus, B, & Brahler, E. 2005. Resilience as a protective personality characteristic in the elderly. *Psychotherapie, psychosomatic, Medizinishe Psychologie,* 55(8): 365-369.

114. Lin, N. 1986. Conceptualising social support. In Lin.N., Dean. A., & Ensel. W., (eds.), *Social Support, Life Events, and Depression*: Orlando, FL. Academic Press: 17-30.

115. Litz, B.T. 2002. Early intervention for mass violence: What is the evidence? What should be done? *Cognitive and Behavioural Practice,* 9(4): 266-272.

116. Longres, J. 1997. Is it feasible to teach HBSE from a strengths perspective, in contrast to one emphasising limitations and weaknesses? In M. Bloom (ed), *Controversial issues in human behaviour in the social environment*. Boston, MA: Allen & Bacon.

117. Lubbe, C. & Eloff, I. 2003. *Asset-based assessment in educational psychology: capturing perceptions during a paradigm shift.* Paper presented at the 9th South African Psychology (PsySSA) conference at Caesars, Johannesburg, South Africa, 25 September.

118. Luthar, S.S. 2006. Resilience in development: a synthesis of research across five decades. In Cicchetti, D. and Cohen, D.J. *Developmental psychopathology: risk, disorder, and adaptation.* New York, NY: Wiley: 739-795.

119. Macdonald, L. 1997. Building on the strengths and assets of families and communities. *Families in Society,* 78 (2): 115-116.

120. McCalister, K.T., Dolbier, C.L., Webster, J.A., Mallon, M.W. & Steinhardt, M.A. 2006. Hardiness and support at work as predictors of work stress and job satisfaction. *American Journal of Health Promotion,* 20(3): 183-191.

121. Maddi, S.R., Harvey, R.H., Resurrection. R., Giatras, C.D. & Raganold, S. (s.a). Hardiness assessment and training as potential management tools in firefighter recruitment programs. *International Fire Service Journal of Leadership and Management.* 1(2) 3-9.

122. Maddi, S.R. & Khoshaba, D.M. 2005. Resilience at work: *How to succeed no matter what life throws at you*. New York, NY. Amacom.

123. Mancini, A.D. & Bonanno, G.A. resilience in the face of potential trauma: clinical practices and illustrations. *Journal of Clinical Psychology.* 62(8): 971-985.

124. Mancini, A.D. & Bonanno, G.A. 2010. Resilience to potential trauma: toward a lifespan approach. In Reich, J.W, Zautra, A.J. and Hall, J.S.(eds) *Handbook of AdultRresilience.* New York, NY: Guildford, 258-273.

125. March, M. 2004. Well-being of older Australians: The interplay of life adversity and resilience in late life development. Unpublished doctoral dissertation, Charles Sturt University, Australia.

126. Martin, R.A. 1989. Humour and the mastery of living: [u]sing humour to cope with the daily stresses of growing up. In McGhee, P.E. (ed), *Humour and children's development: a guide to practical applications:* New York, NY: Haworth: 135-154

127. Masten, A.S. & Coatsworth, J.D. 1998. The development of competence in favourable and unfavourable environments. *American Psychologist*, 53(2): 205-220

128. Masten, A.S. & Wright, M. O. 2010. Resilience over the lifespan: Developmental perspectives on resistance, recovery, and transformation. In Reich, J.W, Zautra, A.J. and Hall, J.S. (eds). *Handbook of Adult Resilience.* New York, NY: Guildford: 213-231.

129. McCarrol, J.E., Ursano, R.J. & Ventis, W.L. 1993. Anticipation of handling the dead: Effects of gender and experience. *British Journal of Clinical Psychology,* 32(4): 466-468.

130. McCarroll, J.E., Ursano, R.J., Fullerton, C.S. & Lundy, A.C. 1995. Anticipatory stress of handling human remains from the Persian Gulf War: Predictors of intrusion and avoidance. *Journal of Nervous and Mental Disease,* 183(11): 700-705

131. McCarroll, J.E., Ursano, R.J., Fullerton, C.S. & Wright, K.M. 1992. Community consultation following a major air disaster, *Journal of Community Consultation,* 20(October): 271-275

132. McCalister, K.T., Dolbier, C.L., Webster, J.A., Mallon, M.W. & Steinhardt, M.A. 2006. Hardiness and support at work as predictors of work stress and job satisfaction. *American Journal of Health Promotion,* 20(3): 183-191.

133. Menendez, A.M., Molloy, J. & Magaldi, M.C. 2006. Health response of New York City fire-fighter spouses and their families post-September 11, 2001 terrorist attacks. *Issues in Mental Health Nursing,* 27(8): 905-917.

134. Miley, K.K. O'Melia, M., and Dubois, B. 2004. Generalist social work practice: an empowering approach, Boston, MA: Allyn and Bacon

135. Miller, L. 1995. Tough guys: psychotherapeutic strategies with law enforcement and emergency services personnel. *Psychotherapy, 32*(4): 592 – 600

136. Miller, A.M. and Chandler, J. 2002. Acculturation, resilience, and depression in midlife women from the former Soviet Union. *Nursing Research,* 51(1): 26-32.

137. Ming-hui Li. 2008. Helping college students to cope: identifying predictors of active coping in different stressful situations. *Journal of Psychiatry, Psychology, and Mental Health, 2(1).* Available at: http://www.scientificjournals.org Accessed: [27 June 2011].

138. Minnard, C.V. 2001. A strong building: foundation of protective factors in schools. *Children and schools*, 24(4): 233-246.

139. Mistovich, J.J., Hafen, B.Q., Kerren, K.J. & Werman, H.A. 1999. Pre-hospital Care, 6th ed. Upper Saddle River, NJ: Prentice Hall.

140. Mitchell, J. & Grady, B. 1990. Emergency service stress: guidelines for preserving the health and careers of emergency services personnel. London, UK. Prentice Hall.

141. Mitchell, J.T. & Everly Jr, G.S. 1995. Critical Incident Stress Debriefing (CISD) and the prevention of work-related traumatic stress among high risk occupational groups. In Everly Jr, G.S. & Lating, J.M. (eds) *Psychotraumatology: Key Papers and Core Concepts in Post – Traumatic Stress.* New York, NY: Kluwer Academic: 267 – 280

142. Mitchell, J. & Everly, G.S. 1997. *Critical incident stress debriefing – CISD: An operations manual for the prevention of traumatic stress among emergency service and disaster workers.* Ellicott City, MD: Chevron.

143. Mitchell, J.T. & Dyrogrow, A. 1993. Traumatic stress in disaster workers and emergency personnel: Prevention and intervention. In Wilson, J.P., and Raphael, B. (eds) *International handbook of traumatic stress syndromes*, New York, NY: Plenum Press: 905-913.

144. Moore, R. 2003. Spiritual assessment. *Social Work,* 48(4): 558-561

145. Moorhouse, A., & Caltabiano, M.L. 2007. Resilience and unemployment: Exploring risk and protective influences for the outcome variables of depression and assertive job searching. *Journal of Employment Counseling*, 44(3): 115.

146. Monette, D.R., Sullivan, T.J. & De Jong, C.R. 2002. *Applied social research: tool for the human services,* 5th ed. Orlando, FL: Harcourt College Publishers.

147. Monteith, B., and Ford-Gilboe, M. 2002. The relationship among mother's resilience, family health work, and mother's health promoting lifestyle practices in families with preschool children. *Journal of Family Nursing,* 8(4): 383-407.

148. Moran, C. & Massam, M. 1997. An evaluation of humour in emergency work. *The Australian Journal of Disaster and Trauma Studies,* 3.

149. Moreland, L.A., Butler, A.D., & Leskin, G.A. 2008. Resilience and thriving in a time of terrorism. *In* Joseph, S. & Linley, P.A. (eds) *Trauma, recovery and growth: positive psychological perspectives on posttraumatic stress.* Hoboken, NJ: Wiley: 39 – 61.

150. National Fire Protection Association. 2000. *NFPA 1003: Standard for airport firefighter professional qualifications.*

151. Neill, J.T., & Dias, K.L. 2001. Adventure education and resilience: The double-edged sword. *Journal of Adventure Education and Outdoor Learning,* 1(2): 35-42.

152. Newman, R. 2005. APA's resilience initiative. *Professional Psychology: Research and Practice.* 36(3): 227-229.

153. Nygren, B. Alex, L. Jonsen, E. Gustafson, Y. Norberg, A., & Lundman, B. 2005. Sense of coherence, purpose in life and self-transcendence in relation to perceived physical and mental health among the oldest old. *Aging and Mental health,* 9(4): 354-362.

154. North, C.S., Tivis, L., McMillen, J.C., Pfefferbaum, B., Spitznagel, E.L., Cox, J., Nixon, S., Bunch, K.P. & Smith, E.M. 2002. Psychiatric Disorders in Rescue Workers After the Oklahoma City Bombing. *The American Journal of Psychiatry*: 159(5): 857-859.

155. North, C.S., Tivis, L., McMillen, J.C., Pfefferbaum, B., Spitznagel, E.L., Cox, J., Nixon, S., Bunch, K.P., Schorr, J. & Smith, E.M., 2002. Coping, functioning and adjustment of rescue workers after the Oklahoma City bombing. *Journal of Traumatic Stress.* 15(3): 171-175.

156. Ochberg, F.M. 1995. Posttraumatic Therapy. In Everly, G.S. and Lating, J.M. Psychotraumatology: *Key Papers and Core Concepts in Posttraumatic Stress*. New York, NY: Kluwer Academic / Plenum.

157. O'Donnell, M.L., Creamer, M. & Pattison, P. 2004. Posttraumatic stress disorder and depression following trauma: understanding co morbidity. *American Journal of Psychiatry*: 161(8): 1390-1396.

158. Ong, A.D, Bergeman, C.S. & Chow, S. 2010. Positive emotions as a basic building block of resilience in adulthood. In Reich, J.W, Zautra, A.J. and Hall, J.S.(eds) *Handbook of Adult Resilience.* New York, NY: Guildford, 81-89.

159. Oosthuizen, R.M. *Job and family stress amongst firefighters*. Unpublished doctoral dissertation. South Africa: University of South Africa.

160. Orthner, D.K., Jones-Sanpei, H. & Williamson, S. A. 2003. Family strength and income in households with children, *Journal of Family Social Work*, 7(2): 5-23.

161. Pargament, K.I. & Cummings. J. 2010. Anchored in faith: Religion as a resilience factor. In Reich, J.W, Zautra, A.J. and Hall, J.S.(eds) *Handbook of Adult Resilience.* New York, NY: Guildford, 193-207.

162. Patterson, J.M. 2002. Understanding family resilience. *Journal of Clinical Psychology,* 58(3): 233-246.

163. Paton, D., Cacioppe, R. & Smith, L. 1995. Critical incident stress in the West Australian fire brigade. In Paton, D. and Violanti, J. (Eds.), *Traumatic stress in critical occupation.* Springfield, IL: Charles C. Charles: 15-57.

164. Paton, D. & Smith, L. 1995. Psychological trauma in critical occupations: Methodological and assessment strategies. In Paton, D. and Violanti, J. (Eds.), *Traumatic stress in critical occupation.* Springfield, IL: Charles C. Charles: 15-57.

165. Paton, D., Ramsey, R. & Sinclair, D. 1995. Occupational and traumatic stress in Lothian and Borders fire brigade. In Paton, D. and Violanti, J (Eds.), *Traumatic stress in critical occupations.* Springfield, IL: Charles C. Charles: 35-36.

166. Paton, D., Violanti, J.M. & Smith, L.M. (eds). 2003. *Promoting capabilities to manage posttraumatic stress: Perspectives on resilience.* Springfield, IL: Charles C. Thomas.

167. Perry, S., Difede, J., Musngi, G., Frances, A.J. & Jacobsberg, L. 1992. Predictors of posttraumatic stress disorder after burn injury. *American Journal of Psychiatry,* 149(7): 931-935.

168. Pfefferbaum, B., North, C.S., Bunch, K., Wilson, T.G., Tucker, P. & Schorr, J. 2002. The impact of the 1995 Oklahoma City bombing on the partners of firefighters. *Journal of Urban Health: Bulletin of the New York Academy of Medicine,* 79(3): 364-372.

169. Pitman, J. Kerpelman, J and Mcfadyen, M. 2004. Internal and external adaptation in army families: lessons learned from operations Desert Shield and Desert Storm. *Family Relations,* 53(3): 249-260.

170. Boeing. Causes of fatal accidents by decade. [Online]. Available from: http://www.planecrashinfo.com. Accessed: [27 June 2011].

171. Prati, G. & Pietrantoni, L. 2009. Optimism, social support, and coping strategies as factors contributing to posttraumatic growth: A meta-analysis. *Journal of Loss and Trauma,* 14(5): 364-388

172. Pratti, G., Pietrantoni, L. & Cocognani, E. 2011. Coping strategies and collective efficacy as mediators between stress appraisal and quality of life among rescue workers. *International Journal of Stress Management,* 1(February): 1-14.

173. Raphael, B. & Newman, L. 2000. *Disaster Mental Health Response Handbook*. North Sydney, New South Wales. Government printers.

174. Raphaely, J. Forward. 1998. In Thamm, M. *I have life: Alison's journey*. Rosebank, South Africa: Penquin.

175. Regehr, C., Hill, J. & Glancy, G.D. 2000. Individual predictors of traumatic reactions in firefighters. *Journal of nervous and Mental Disease,* 188(6): 333-339.

176. Regehr, C., Dimitropoulos, G., Bright, E., George, S. & Henderson, J. 2005. Behind the brotherhood: Rewards and challenges for wives of firefighters. *Family Relations,* 54(3) 423-435.

177. Regehr, C. Goldberg, G. Glancy, G. & Knott, T. 2002. Post-traumatic stress and disability in paramedics. *Canadian Journal of Psychiatry,* 47(10): 953-958.

178. Rew, L. Taylor-Seehafer, M, Thomas N.Y., & Yockey, R.D. 2001. Correlates of resilience in homeless adolescents. *Image: Journal of Nursing Scolarship,* 33(1): 33-40.

179. Richardson, G.E. 2002. Methatheory of resilience and resiliency. *Journal of Clinical Psychology,* 58(3): 307-321.

180. Richardson, K.L. 2003. Airport rescue and fire fighting standards: do the benefits justify the costs? Cranfield University. (MSc. Thesis)

181. Runkewitz, K. Kirchmann, H., & Strauss, B. 2006. Anxiety and depression in primary care patients: Predictors of symptom severity and developmental correlates. *Journal of Psychosomatic Research,* 60(5): 445-*453*.

182. Rutter, M. 1985. Resilience in the face of adversity: protective factors and resistance to psychiatric disorder. *British Journal of Psychiatry,* 147: 598-611.

183. Rutter, M. 1987. Psychosocial resilience and protective mechanisms. *American Journal of Orthopsychiatry,* 57(xx): 316-331

184. Rutter, M. 2007. Resilience, competence, and coping. *Child abuse and neglect*, 31(3): 205-209.

185. Saleebey, D. 1996. The strengths perspective in social work practice: Extensions and cautions. *Social Work,* 41(3): 296-305

186. Saleebey, D. 1997. *The strengths perspective in social work practice.* New York, NY: Longman.

187. Saleebey, D. 2002. *The strengths perspective in social work practice.* 3rd ed. Boston, MA: Allyn and Bacon

188. Sarason, S.B. 1974. The psychological sense of community: Prospects for a community psychology. San Francisco, CA: Jossey-Bass

189. Schachman, K. Lee, R.K., & Lederman, R.P. 2004. Baby boot camp: facilitating maternal role among military wives. Nursing Research, 33(2): 107-115.

190. Seligman, M.E.P. 1999. The president's address. *American Psychologist,* 54: 559-562.

191. Seligman, M.E.P., & Csikszentmihalyi, M. 2000. Positive Psychology: An Introduction. *American Psychologist*, 55(1): 5-14

192. Shaw, A., Joseph, S. & Linley, P.A. 2005. Religion, spirituality, and growth: A systematic review. *Mental Health, Religion and Culture,* 8(1): 1-11.

193. Silberberg, S. 2001. Searching for family resilience. *Family Matters,* 58(Autumn): 52-57

194. Siomkos, G.J. Managing airline disasters: the role of consumer safety perceptions and sense-making. *Journal of Air Transport Management,* 6(2): 101-108.

195. Shakespeare-Finch, J. Smith, S. & Obst, P. 2002. Trauma, coping resources, and family functioning in emergency services personnel: A comparative study. *Work & Stress*, 16(3): 275-282.

196. Shearer, L. 2001. When the friendly skies are not so friendly. *Georgia Magazine*: 64.

197. Silver, R. 2004. Conducting research after the 9/11 terrorist attacks: Challenges and results. *Families, Systems, & Health.* 22(1): 47-51.

198. Slawinski, T. 2005. A strengths-based approach to crisis response. *Journal of Workplace Behavioural Health,* 21(2): 79-88.

199. Slottje, P., Twisk, J.W.R., Smidt, N., Huizink, A.C., Witteveen, A.B., Van Mechelen, W. & Smid, T. 2007. Health related quality of life of firefighters and police officers 8.5 years after the air disaster in Amsterdam. *Quality of Life Research,* 16(2): 239-252.

200. Slepski, L.A. 2005. Emergency preparedness: concept development for nursing practice. *Nurse Clinical North America,* 40(3): 419-430.

201. South Africa. 2002. *Disaster Management Act* (Act 57 of 2002) Pretoria: Government Printer.

202. South African Power Flying Association, s.a *1910-1920 – Early flying in South Africa.* [Online]. Available from: http://www.sapfa.org.za. Accessed: [3 March 2011].

203. Smith, C. & Carlson, B.E. 1997. Stress, coping, and resilience in children and youth. The *Social Service Review,* 71(2): 231-248.

204. Solomon, S.D. 1989. Research issues in assessing disaster's effects. In R. Gist & B. Lubin (Eds.), *Psychosocial Aspects of Disaster*. New York, NY: Wiley.

205. South Africa. 2002. *Disaster Management Act* (Act 57 of 2002). Pretoria: Government Printer.

206. South Africa. 2009. The Civil Aviation Act (Act 13 of 2009). Pretoria: Government Printer.

207. South African Civil Aviation Authority. *Airport rescue and fire-fighting manual of procedure.* SACAA.

208. Staats, S. Cosmar, D., & Kaffenberger, J. 2007. Sources of happiness and stress for college students: A replication and comparison over 20 years. *Psychological Reports,* 101(3): 685-696.

209. Steinhardt, M.A., Dolbier, C.L., Gottlieb, N.H. & McCalister, K.T. 2003. The relationship between hardiness, supervisor support, group cohesion, and job stress as predictors of job satisfaction. *American Journal of Health Promotion,*17(6): 382-389).

210. Stern, S.B. Rohner, R.P., & Sacks-Stern, B.J. 2007. Relations of self-reported material acceptance and behavioural control with acting-out aggressive behavior in children diagnosed with ADHD. *Psychological Reports,* 101(3): 675-684.

211. Stewart, M., Graham, R., Buckles, L., Edgar, W., Mangham, C., Tilley, N. & Jackson, S. 1999. *A study of resilience in communities*. Ottawa, Ontario, Health Canada.

212. Strauss, B. Brix, C., & Fischer, S. 2007. The influence of resilience on fatigue in cancer patients undergoing radiation therapy. *Journal of Cancer and research Clinical Oncology,* 133(8): 511-518.

213. Suvak, M. Maguen, S. Litz, B.T. Silver, R.C. & Holman, E.A. 2008. Indirect exposure to the September 11 terrorist attacks: Does symptom structure resemble PTSD? *Journal of Traumatic Stress,* 21(1): 30-39.

214. Tedeschi, R.G. & Calhoun, L.G. 2004. Posttraumatic growth: Conceptual foundations and empirical evidence. *Psychological Enquiry,* 1591): 1-18

215. Tedeschi, R.G. & Kilmer, R.P. 2005. *Professional Psychology: Research and Practice,* 36(3): 230-237.

216. Thomson, C.W, Durrant, L., & Barusch, A. et. al. 2006. Fostering coping skills and resilience in Home Enteral Natrition consumers. *Nutrition and Clinical Practice,* 21(6): 557-565.

217. Tucker, P., Pfefferbaum, B., Doughty, D.E., Jones, D.E. Jordan, F.B. & Nixon, S.J. 2002. Body handlers after terrorism in Oklahoma City: Predictors of posttraumatic stress and other symptoms. *American Journal of Orthopsychiatry*, 72(4): 469-475

218. United Nations. 1992. *Disaster Management Training Program: An overview of disaster management*. 2nd ed. New York, NY: United Nations.

219. Ursano, R.J. Greiger, T.A., & McCarroll, J.E. 1996. Prevention of posttraumatic stress: consultation, training, and early treatment. In Van der Kolk, Mcfarlane, A.C., & Weisath, L (eds). *Traumatic stress: The effects of overwhelming experience on mind, body, and society.* 441-462. New York, NY: Guilford

220. Varvel, S.J, He, Yuhong, Shannon, J.K., Tager, D, Bledman, R.A, Chaichanasakul, A, Mendoza, M.M. & Mallincrodt, B. 2007. Multidimensional, threshold effects of social support in firefighters: is more support invariable better? *Journal of Counseling Psychology.* 34(4): 458-465.

221. Violanti, J.M., Paton, D. & Dunning, C. (eds). (2000). *Posttraumatic stress interventions: Challenges, issues and perspectives*. Springfield, IL: Charles C, Thomas.

222. Wadsworth, M.E. & Santiago, C.D. 2008. Risk and resiliency processes in ethnically diverse families in poverty*. Journal of Family Psychology*. 22(3): 399-410.

223. Wagnild, G. 2009. The resilience Scale User's Guide for the US English version of the Resilience Scale. Worden, MT. the Resilience Center.

224. Wagnild, G., and Young, H. 1993. Development and psychometric evaluation of the Resilience Scale. *Journal of Nursing Measurement,* 1(2): 165-178.

225. Wagnild, g. 2003. Resilience and successful aging: comparison among low and high income older adults. *Journal of Gerontological Nursing,* 29(12): 42-49.

226. Wagnild, G. 2009. A review of the Resilience Scale. *Journal of Nursing Measurement*, 17(2): 105-113.

227. Wagnild, G., and Collins, J.A. 2009. Assessing resilience. *Journal of Psychosocial Nursing and Mental Health Services*, 47(12): 28-33.

228. Walker, B.H., Holling, C.S., Carpenter, S. & Kinzig, A. 2004. Resilience, adaptability, and transformability in social-ecological systems. *Ecology and Society,* 9(2): 5

229. Walsh, F. 1998. *Strengthening family resilience.* New York, NY: Guildford Press.

230. Walsh, F. 2002. A family resilience framework: Innovative practice applications. *Family Relations:* 51(2): 130-137.

231. Waller, M. & Bird, M.Y 2002. Strengths of first nation's peoples. In Saleebey, D. 2002. *The Strengths Perspective in Social Work Practice*. 3rd ed. Boston, MA: Allyn and Bacon: 48-62

232. Wells, M. resilience in rural community-dwelling older adults. Available at: http://www.upstate.edu [Online]. Accessed:[23 September 2010].

233. Werner, E. 1989. High risk children in youth adulthood: A longitudinal study from birth to 32 years. *American Journal of Orthopsychiatry,* 59(1): 72-81.

234. Werner, E.E. & Smith, R.S. 1982. *Vulnerable and invincible: A longitudinal study of resilient children and youth.* New York, NY: McGraw Hill.

235. Werner, E.E. & Smith, R.S. 1992. *Overcoming the odds: High risk children from birth to adulthood.* London, UK: Cornell University Press.

236. Willis, R.O. *An examination of critical incident stress debriefing for emergency service providers*: *A quasi-experimental field survey*. Unpublished Ph.D dissertation. Baltimore: University of Maryland.

237. Williams, K.L. & Galliher, R.V. 2006. Predicting depression and self esteem from social connectedness, support, and competence. *Journal of Social and Clinical Psychology,* 25(8): 855-874.

238. Williams, M., Tuffy, L.M. & Grinnell, R.M. 1995. Research in social work: an introduction. Itasca, IL: Peacock.

239. Wisner, B. Blaikie, P. Cannon, T. & Davis, I. 2004. *At risk: natural hazards, people's vulnerability and disasters*. London, UK: Routledge.

240. Wolin, S.J. & Wolin, S. 1993. *The resilient self.* How survivors of troubled families rise above adversity. New York, NY: Villard.

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KING SHAKA
INTERNATIONAL AIRPORT
AIRPORTS COMPANY SOUTH AFRICA

23rd of June 2011

Mervyn Nefdt

Manager: Fire and Rescue Services

Airports Company South Africa

King Shaka International Airport

Dear Mervyn

MASTERS DEGREE

Your request to obtain consent to utilise the Fire and Rescue staff at King Shaka International Airport (KSIA) to participate in a questionnaire which forms part of a critical component of your Masters Degree in Disaster Management has reference:

You are hereby provided with the required authorisation to utilise the KSIA Fire and Rescue Staff providing that the following are adhered to:

1. Minimum manning levels to be maintained at all times
2. No overtime for staff will be authorised
3. All information gathered is regarded as confidential
4. A copy of the results of your questionnaire to be made available prior to submission

Your assistance in complying with the above items is appreciated.

Yours Sincerely,

Terence Delomoney
Regional General Manager
King Shaka International and Domestic Airports
Airports Company South Africa
Direct: +27 (0) 32 436 6510
Fax to E-Mail: +27 (0) 86 604 4408
Cell: +27 (0) 82 414 8615
E-Mail: Terence.Delomoney@airports.co.za

CC: *Bongiwe Fityi – AGM: Airport Operations KSIA*
Seshni Krishna – Manager: Human Resources (Acting)

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ADDENDUM B: Instruments that measure resilience.

Instrument Name	Baruth Protective Factors Inventory (BPFI)	Connor-Davidson Resilience Scale CD-RISC	Resilience Scale for Adults (RSA)	Adolescent Resilience Scale (ARS)	Brief-Resilient Coping Scale (BRCS)	Resilience Scale (RS)
Author	Baruth and Carroll, 2002	Connor and Davidson, 2003	Friborg et al., 2003	Oshio, Kaneko, Nagamine, and Nakaya, 2003	Sinclair and wallston, 2004	Wagnild and Young, 1993
Domain or construct measured	Protective factors that support resiliency	Resilience as a measure of successful stress-coping ability	Central protective resources of healthy adjustment	Adolescent resilience	Resilient coping behaviours	Resilience as a positive personality characteristic that enhances individual adaptation.

ADDENDUM C – Questionnaire

The data collected through this questionnaire, which should be completed in approximately 30 minutes, seeks to assess the general mental preparedness of airport fire fighters at King Shaka International Airport to deal with aircraft accidents resulting in mass fatalities, grotesque burn injuries, multiple fractures, mutilations and suffering in order to determine how best the company can provide support for and after exposure to potentially traumatic events.

The contents of this questionnaire are absolutely confidential and information identifying the respondent will not be disclosed under any circumstances.

Please complete the questions and make an X in the blocks to indicate your answer.

Part A

Venue: King Shaka International Airport

1. Rank of respondent:…… Gender: Male ☐ Female ☐
2. Age group: 18 – 29 ☐ 30 – 39 ☐ 40 – 49 ☐ 50 and older ☐
3. Marital Status

Married	Single	Divorced	Widower/Widow	Living together

4. EDUCATION

   What is the level of your education?

Matric		Other fire related qualifications, diplomas, degrees etc. Please specify.	
Fire Fighter One			
Fire Fighter Two			
Preliminary Certificate in Fire Fighting			
Certificate in Fire Fighting			
Higher Certificate in Fire Fighting			

5. How many years employed as a Fire fighter (Airport and other professional service)

Years	Airport fire fighting	Non airport fire fighting
0 – 2		
3 – 10		
11 years and more		

6. How would you describe your health status

Poor	Fair	Good	Very good	Excellent

7. Have you ever experienced symptoms of depression.

Never	Sometimes	Frequently	All the time.

8. Have you ever been exposed to accidents with multiple fatalities, grotesque burn injuries, multiple fractures and mutilations at the same accident?

YES	NO

9. If yes in question 8, how many fatalities (deaths) were there? If no, proceed to question 10

0 to 10	
11 to 20	
21 to 50	
51 to 100	
> 100	

10. EMOTIONAL SUPPORT

10.1 Did you receive emotional support after being exposed to mass fatalities, grotesque burn injuries, multiple fractures and mutilations?

YES	NO

10.2 If yes in question 10.1 , please complete the table below. What type of support and from who did you receive support?

Professional counselling services	
Religious support	
Traditional healers or rituals	
Family	
Peers	
Friends	
Employee Assistance Practitioners (EAP)	
Supervisors/Managers at work	
None	
Other: Please specify	

11. After future exposure to mass fatalities, grotesque burn injuries, multiple fractures, mutilations, and suffering, from who would you most likely seek or get support from? Please fill in the number 1 in the box indicating your first choice (most likely) and subsequent numbers indicating your least likely choice. The sources you will not consider should be left blank.

Professional counselling services	
Religious support	
Traditional healers or rituals	
Family	
Peers	
Friends	
Employee Assistance Practitioners (EAP)	
Supervisors/Managers at work	
None	
Other: Please specify	

12. What skills/competence do you have? Please tick the appropriate boxes.

Aircraft construction (Basic)		Aircraft Construction (Advanced	
Heavy Vehicle Driving		Pump Operator	
Level 3 First Aid		Basic Life Support	
Intermediate Life Support		Advanced Life Support	
Aircraft Marshalling		Radio Telephony	
Aircraft Fire fighting (Basic)		Aircraft Fire Fighting (Advanced	
Other Training: Please specify			

13. To what degree do you consider the training you received will protect you against the gruesomeness of dealing with aircraft accidents resulting in mass fatalities, grotesque burn injuries, multiple fractures and mutilations?

1	2	3	4	5	6	7
Will not protect me			Might protect me			Will certainly protect me

14. SOCIAL SUPPORT

Social support can be defined as knowing that we are part of a community of people who love and care for us. Social support refers the physical and emotional comfort given to us by our family, friends, co-workers and others. How strong is your social support?

Support from:	Very strong	Moderately strong	Weak
Family			
Friends			
Co-workers			
Other (Please specify)			

15. RELIGION

To what degree do you view your religion as a strength that will protect you against the gruesomeness of dealing with aircraft accidents resulting in mass fatalities, grotesque burn injuries, multiple fractures, mutilations and suffering?

1	2	3	4	5	6	7
Will not protect me			Might protect me			Will certainly protect me

16. RELATIONSHIPS

Do you describe your relationship?

Relationship	Never	Sometimes	Always
With your family as positive and caring?			
At work as positive and caring?			

17. FAMILY SUPPORT

Supportive families are considered as one of the most important factors related to resilience. Fire fighters is said to belong to two families namely the family at home and the family at work.

17.1 Is your **family at home?**

	Never	Sometimes	Always
Characterized by appreciation and affection?			
How often does your family show love, care, concern and interest for each other?			
Positive communication?			
Enjoyable times together?			
Manage stress and crisis effectively?			

17.2 Communication

Do you perceive the communication within your family as positive?	Not at all	Sometimes	Always

17. 3 Togetherness

Do you share a sense of belonging, beliefs and morals with your family?	Yes	No

18. SUPPORT AT WORK

The following statements may apply to your work situation. Indicate to what extent it applies:

	Never	Sometimes	Always
We share and show love, care, concern appreciation, concern and interest for each other.			
We are like a “family” at work.			
We have enjoyable time together			
We manage stress and crisis effectively			
There is positive communication within and between our platoon members.			
We share a sense of belonging, beliefs and morals on our platoon.			

19 Acceptance

Showing respect, appreciation, and understanding for each other's individuality and uniqueness is a strength when family members acknowledge, value and tolerate each other's differences, and when the members allow each other space.

To what extent does the above statement describe your family at home?						
1	2	3	4	5	6	7
To what extent does the above statement apply at work?						
1	2	3	4	5	6	7

20. RECREATIONAL ACTIVITIES

20.1 What recreational activities do you share with your family at home? Only tick the activities you participate.

ACTIVITIES	
Camping	
Socialising	
Playing games (cards, dominoes etc)	
Hiking	
Sports	
Other, please specify	
None	

20.2 In which of the following recreational activities do you participate with your work colleagues?

ACTIVITIES	
Camping	
Socialising	
Playing games (cards, dominoes etc)	
Hiking	
Sports	
Other, please specify	
None	

21. EMOTIONAL SUPPORT

Emotional support refers to those things that help us in time of need.

21.1 Family support.

Family support is assisting, encouraging, reassuring each other and looking out for each other. It is considered to be a strength when family members feel equally comfortable to offer or ask for support.

To what degree can you depend on your family at home for emotional support when required?

1	2	3	4	5	6	7
My family is not a strong Source of emotional support						My family is a strong source of emotional support

21.2 Support at work.

Colleagues is considered to be supportive when they share good and bad times together, help each other through difficult times and can rely upon each other.

To what degree can you depend on your work colleagues for emotional support when required?

1	2	3	4	5	6	7
My place of work is not a strong Source of emotional support						My place of work is a strong source of emotional support

22. COMMITMENT AT WORK.

22.1 Showing dedication and loyalty as a whole is a strength. Strong teams often view the wellbeing of their team as a first priority. Rate the commitment level of the fire fighters on your platoon to each other.

Low level of commitment						High level of commitment
1	2	3	4	5	6	7

23. PERSONAL PREPAREDNESS

In your opinion, are you mentally prepared to deal with mass fatalities, grotesque injuries, death and dying patients?		
Not at all	Not sure	Most definitely

23.1 Motivate your answer.

24. PERSONAL RESILIENCE

To what degree do you consider yourself as resilient against the psychological effects of exposure to mass fatalities, grotesque burn injuries, multiple fractures, mutilations and suffering?						
1	2	3	4	5	6	7
I am vulnerable			might be resilient			I am definitely resilient

Part B

The Resilience Scale (RS)

Please read each statement and circle the number to the right of each statement that best indicates your feelings about the statement. Respond to all statements.

Circle the number in the appropriate column	Strongly Disagree						Strongly Agree
1. When I make plans, I follow through with them	1	2	3	4	5	6	7
2. I usually manage one way or another.	1	2	3	4	5	6	7
3. I am able to depend on myself more than anyone else.	1	2	3	4	5	6	7
4. Keeping interested in things is important to me.	1	2	3	4	5	6	7
5. I can be on my own when I have to.	1	2	3	4	5	6	7
6. I feel proud that I have accomplished things in life.	1	2	3	4	5	6	7
7. I usually take things in stride.	1	2	3	4	5	6	7
8. I am friends with myself.	1	2	3	4	5	6	7
9. I feel that I can handle many things at a time.	1	2	3	4	5	6	7
10. I am determined.	1	2	3	4	5	6	7
11. I seldom wonder what the point of it all is.	1	2	3	4	5	6	7
12. I take things one day at a time.	1	2	3	4	5	6	7
13. I can get through times because I've experienced difficulty before.	1	2	3	4	5	6	7
14. I have self-discipline	1	2	3	4	5	6	7
15. I keep interested in things.	1	2	3	4	5	6	7
16. I can usually find something to laugh about.	1	2	3	4	5	6	7
17. My belief in myself gets me through hard times.	1	2	3	4	5	6	7
18. In an emergency, I am someone people can generally rely on.	1	2	3	4	5	6	7

19. I can usually look at a situation in a number of ways.	1	2	3	4	5	6	7
20. Sometimes I make myself do things whether I want to or not.	1	2	3	4	5	6	7
21. My life has meaning.	1	2	3	4	5	6	7
22. I do not dwell on things I can't do anything about.	1	2	3	4	5	6	7
23. When I am in a difficult situation, I can usually find my way out of it.	1	2	3	4	5	6	7
24. I have enough energy to do what I have to do.	1	2	3	4	5	6	7
25. It's okay if there are people who don't like me.	1	2	3	4	5	6	7

Source: 1993 Gail M. Wagnild, and Heather M. Young. Used by permission.

Part C

	Below are statements about life that people often feel differently about. Please show how much you think each one is true about you. Give your own honest opinions…… There is no right or wrong answers.	Not at all true	A little true	Quite true	Completely true
1	Most of my life gets spent doing things that are meaningful				
2	By working hard you can nearly always achieve your goals				
3	I don't like to make changes in my regular activities				
4	I feel that my life is somewhat empty of meaning				
5	Changes in routine are interesting to me				
6	How things go in my life depends on my own actions				
7	I really look forward to my work activities				
8	I don't think there is much I can do to influence my own future				
9	I enjoy the challenge when I have to do more than one thing at a time				
10	Most days, life is really interesting and exciting for me				
11	It bothers me when my daily routine gets interrupted				
12	It is up to me to decide how the rest of my life will be				
13	Life in general is boring for me				
14	I like having a daily schedule that doesn't change very much.				
15	My choices make a real difference in how things turn out in the end				

Source: Bartone, P.T. 2009. Used with permission

ADDENDUM D: Motivations to answers for question 23.1

The respondents that answered **MOST DEFINITELY** in question 23, gave the following justifications for their responses: The response is recorded verbatim.

1. Training that I received.
2. Responded for an accident before and handle quite well.
3. As a dedicated HOD and having worked so many years in this field, I have seen and been involved in those accident/incidents.
4. Have experience.
5. Because it s my job and I am strong for that.
6. I am well aware of dangers, gruesome sites, bad injuries before joining the fire department. I have already been exposed to accidents and handled myself.
7. The level of training that I have I'm sure that I can deal with those situations
8. Strong family support; company EAP; close friends
9. First I take this as not a job I take it as a calling and I believe I am strong mental and believe in God Power. The most important I have a strong family.
10. My fellow firefighters will support me.
11. I am in the ARFF for almost two years now and I know what is required from me when the real thing happens. Also I have worked with people who has many years of experience and that has really helped me to have a better understanding.
12. Within the level of training I have and within the passion I have as a firefighter to rescue people ' life and with the trust that I have in my colleagues that make me feel strong in dealing with anything that comes my way.
13. I have seen and done a lot in my lifetime, so I feel that I am mentally prepared to handle anything that is put in front of me.
14. I can control my emotions.
15. As part and parcel of my job always strong as anything can happen any time. Bearing in mind that talking about fire and rescue to protect life and property.

16. I am a strong -willed character. Never have and never will back down from a situation that I am confronted with
17. I as a firefighter knew what I would face by taking this job. So i know what I was getting myself into.
18. I am a firefighter. It is my responsibility to save lives & protect property. Everyday as I come on shift or before I sleep at home I ask Jesus to protect us, the aircraft passengers and terminal. But I am ready.
19. My job is to save lives. I am well prepared to do this
20. In the beginning I was not sure until I received training. The only problem is, I am motivated as a firefighter but I have not been to a real incident, but I feel confident enough.
21. The training we received is preparing us for the same situations should they happen in our environment.
22. If one has a passion for his/her job he/she should be prepared for what's at stake. I came into this field hoping that if something had to go down I would be able to make a difference in someone's life and I look forward to that.
23. I have strong support of people through good and bad times.
24. My job was a calling for me before I started with ACSA. I came prepared for anything.
25. Our goal is one day to save lives and protecting property around the airport communities.
26. I am in the job. I know at some time in the job I am going to see fatalities, so I must be prepared to see injuries and deaths.
27. I have been at mass casualty situations before, during my work as a paramedic.
28. Personally I have been involved in quite a lot of training as well as the bomb attack in Jan Airport in 1994. Obviously the real mckoy will not go according to plan but yes I am prepared and my platoon as well.

29. Been involved in many incidents, MVAs, building collapses, stabbings, shootings, fires with a number of fatalities, drowning, electrocutions, suicides... worked for nearly 10 years for Ethekweni Fire. Got used to it.
30. God will protect us all.
31. Up until I get involved to that situation I can deduct the answer. Sometimes I become emotional. In that situation I can't concentrate and I can't deal with it. At the present stage I feel that I can deal with it.
32. Have not been exposed to this type of incident as yet. I think I would handle it, but I think
33. I have tried y all means to develop myself in getting ready for emergencies and to be emotionally fit. I have done even voluntary work at hospitals so to get the feel of facing injuries and many patients at once.
34. It's my support that I have always been willing and will always give to help a person in need of a life threatening situation. I've always been anxious to rescue and save lives.
35. I was emotionally strong when my father passed away. I also witnessed a MVA and the person died.
36. I have handle a few aircraft accident involving small aircraft but not a mass fatalities or big aircraft involving death but I am confident I will have no problem.
37. I have been exposed to mass fatalities before and I handled it quite well. All my years of fire fighting I feel confident to handle any disaster.
38. With help from God anything is possible, also with help from colleagues I will be mentally prepared to deal with the situation as mentioned above. As a firefighter no person is left to stand alone we stand together always.
39. Strong minded, strong internally, saw fatalities before. I chose this job to help people in need dead or alive.
40. Because I am person. How is very strong mentally and I care for the people.
41. Yes, because as I am working here, I am here to save people's life so for me I am prepared.

42. I am most definitely because I am mentally prepared because we doing trainings.
43. Well trained motivated and full equipped and mental fit and physical and always ready for action.
44. I fully trained for any accident. It is my passion to face any situation special risk.
45. I have mentally prepared myself to deal with any situation at work, by always saying to myself that I am strong and my main intentions are to save lives and assist the needy.

The respondents that answered **NOT SURE** in question 23, gave the following justifications for their responses: The response is recorded verbatim.

46. Never been exposed to mass fatalities especially from aircrafts
47. I have not been involved in such incidents. I responded to one incident where one patient died in an aircraft. I would not know if there are so many fatalities.
48. I've not experience so many patients when I should rescue and some dies.
49. In the classroom we can learn all there is to know about fire fighting. When it comes to actually practice what we have learnt, it is a different situation. Also, no two emergencies will ever e the same so nothing can prepare you until you are at the incident/accident.
50. I have not been exposed to the above. I cannot say if I can handle it.
51. As I have been in the fire and rescue industry 1 year 8 months went by. I have not been exposed to any danger . I feel well prepared and waiting for any real exposure not sure if what will be the outcome after that
52. Death has always been there before we were borne will be there after our death but it is something one can never get used to, because the pain at losing a soul is always the same, but I am ready to save lives.
53. I've never been in a situation before yet I think I am strong. But I believe being a firefighter you go opposite side in the time of accident , meaning when people run for their lives you go in to save life.

54. I prepare and embrace myself mentally as much and efficient as what can to be ready for any incident involving mass fatalities, but in respect of reality it would be impossible for me to say whether I will be ready for sure or not.
55. Have not yet experienced a mass fatality. I am prepared to do my best to save lives. But as to I will react mentally, I am not sure.
56. I have not faced something like that so far but working as a fireman it is my duty to prepare and be ready for such events in time.

ADDENDUM E - The Resilience Scale (RS)

Please read each statement and circle the number to the right of each statement that best indicates your feelings about the statement. Respond to all statements.

Circle the number in the appropriate column	Strongly Strongly Disagree Agree						
26. When I make plans, I follow through with them	1	2	3	4	5	6	7
27. I usually manage one way or another.	1	2	3	4	5	6	7
28. I am able to depend on myself more than anyone else.	1	2	3	4	5	6	7
29. Keeping interested in things is important to me.	1	2	3	4	5	6	7
30. I can be on my own when I have to.	1	2	3	4	5	6	7
31. I feel proud that I have accomplished things in life.	1	2	3	4	5	6	7
32. I usually take things in stride.	1	2	3	4	5	6	7
33. I am friends with myself.	1	2	3	4	5	6	7
34. I feel that I can handle many things at a time.	1	2	3	4	5	6	7
35. I am determined.	1	2	3	4	5	6	7
36. I seldom wonder what the point of it all is.	1	2	3	4	5	6	7
37. I take things one day at a time.	1	2	3	4	5	6	7
38. I can get through times because I've experienced difficulty before.	1	2	3	4	5	6	7
39. I have self-discipline	1	2	3	4	5	6	7
40. I keep interested in things.	1	2	3	4	5	6	7
41. I can usually find something to laugh about.	1	2	3	4	5	6	7
42. My belief in myself gets me through hard times.	1	2	3	4	5	6	7
43. In an emergency, I am someone people can generally rely on.	1	2	3	4	5	6	7
44. I can usually look at a situation in a number of ways.	1	2	3	4	5	6	7
45. Sometimes I make myself do things whether I want to or not.	1	2	3	4	5	6	7
46. My life has meaning.	1	2	3	4	5	6	7
47. I do not dwell on things I can't do anything about.	1	2	3	4	5	6	7
48. When I am in a difficult situation, I can usually find my way out of it.	1	2	3	4	5	6	7

49. I have enough energy to do what I have to do.	1	2	3	4	5	6	7
50. It's okay if there are people who don't like me.	1	2	3	4	5	6	7

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Addendum F - A list of published studies in which the Resilience Scale was used.

1. Assis, S.G, Santos, N. Oliveira R and Carvalhaes, D. 2004 Risk and protection: looking for an equilibrium that provides resilience. *Psic: Teor. E pesq,* 20(2): 135 – 43.
2. Black, C. and Ford—Gilboe, M. 2004. Adolescent mothers: resilience, family health work and health-promoting practices. *Journal of Advanced Nursing,* 48(4): 351-360.
3. Brix, C. Schleassner, C., and Fuller, J, et al. 2008. The need for psychological support and its determinants in a sample of patients undergoing radiooncological treatment of cancer. *Journal of Psychosomatic Research,* 65(6): 541-548.
4. Broyles, L.C. 2005. Resilience: Its relationships to forgiveness in older adults. Unpublished doctoral dissertation, University of Tennessee, Knoxville.
5. Caltabiano, M.L. and Caltabiano, N.L. 2006. Resilience and health outcomes in the elderly. Available at: http://www.aag.asn.au/filelib/Diversity_Ageing_2006-AAg.pdf.
6. Christopher, K.A. 2006. Determinants of psychological well-being in Irish immigrants. *Western Journal of Nursing Research,* 22(2): 123-143.
7. Glasberg, A.L. Eriksson, S., and Norberg. 2008. Factors associated with "stress of conscience" in health care. *Scandinavian Journal of Caring Science,* 22(2): 249-258.
8. Heilermann, M.V. Lee,, K.A. and Kury, F.S. strength factors among women of Mexican descent. *Western Journal of Nursing Research,* 27(8): 949-965.
9. Humielski, K.M. and Carr. J.C. 2007. The relationship between entrepreneur psychological capital and well-being. Available at: http://babson.edu/entrep/fer/2007FER/cv_p3.html.
10. Humphreys, J. 2003. Research in sheltered battered women. *Issues in Mental health Nursing: 24(1):*137-152).
11. Hunter, A.J. and Chandler, G.E. 1999. Adolescent resilience. *Image: Journal of Nursing Scholarship:* 31(2): 243-247.

12. Leppert, K. Gunzelmann, T. Schumacher, J. Straus, B, and Brahler, E. 2005. Resilience as a protective personality characteristic in the elderly. *Psychotherapie, psychosomatic, Medizinishe Psychologie,* 55(8): 365-369.
13. March, M. 2004. Well-being of older Australians: The interplay of life adversity and resilience in late life development. Unpublished doctoral dissertation, Charles Sturt University, Australia.
14. Miller, A.M. and Chandler, J. 2002. Acculturation, resilience, and depression in midlife women from the former Sovirt Union. *Nursing Research,* 51(1): 26-32.
15. Ming-hui Li. 2008. Helping college students to cope: Odentifying predictors of active coping in different stressful situations. *Journal of Psychiatry, Psychology, and Menta Health, 2(1).* Available at: http://www.scientificjournals.org/journals2008/articles/1339.pdf
16. Monteith, B., and Ford-Gilboe, M. 2002. The relationship among mother's resilience, family health work, and mother's health promoting lifestyle practices in families with preschool children. *Journal of Family Nursing,* 8(4): 383-407.
17. Moorhouse, A., and Caltabiano, M.L. 2007. Resilience and unemployment: exploring risk and protective influences for the outcome variables of depression and assertive job searching. *Journal of Employment Counseling, 44(3): 115.*
18. Neill, J.T., and Dias, K.L. 2001. Adventure education and resilience: The double-edged sword. *Journal of Adventure Education and Outdoor Learning,* 1(2): 35-42.
19. Nygren, B. Alex, L. Jonsen, E. Gustafson, Y. Norberg, A., and Lundman, B. 2005. Sense of coherence, purpose in life and self-transcendence in relation to perceived physical and mental health among the oldest old. *Aging and Mental health, 9(4): 354-362.*
20. Rew, L. Taylor-Seehafer, M, Thomas N.Y., and Yockey, R.D. 2001. Correlates of resilience in homeless adolescents. *Image: Journal of Nursing Scolarship,* 33(1): 33-40.
21. Runkewitz, K. Kirchmann, H., and Strauss, B. 2006. Anxiety and depression in primary care patients: Predictors of symptom severity and developmental correlates. *Journal of Psychosomatic Research,* 60(5): 445-*453*.
22. Schachman, K. Lee, R.K., and Lederman, R.P. 2004. Baby boot camp: Facilitating maternal role among military wives. Nursing Research, 33(2): 107-115.

23. Strauss, B. Brix, C., and Fischer, S. 2007. The influence of resilience on fatigue in cancer patients undergoing radiation therapy. *Journal of Cancer and research Clinical Oncology,* 133(8): 511-518.
24. Thomson, C.W, Durrant, L., and Barusch, A. et. al. 2006. Fostering coping skills and resilience in Home Enteral Natrition (HEN) consumers. *Nutrition and Clinical Practice,* 21(6): 557-565.
25. Wagnild, G., and Young, H. 1993. Development and psychometric evaluation of the Resilience Scale. *Journal of Nursing Measurement,* 1(2): 165-178.
26. Wagnild, g. 2003. Resilience and successful aging: comparison among low and high income older adults. *Journal of Gerontological* Nursing, 29(12): 42-49.
27. Wagnild, G. 2009. A review of the Resilience Scale. *Journal of Nursing Measurement*, 17(2): 105-113.
28. Wagnild, G., and Collins, J.A. 2009. Assessing resilience. *Journal of Psychosocial Nursing and Mental Health Services*, 47(12): 28-33.
29. Wells, M. resilience in rural community-dwelling older adults. Available at: http://www.upstate.edu/con/pdf/meega_poster.pdf.

ADDENDUM G – The Dispositional Resilience Scale(DRS)

Below are statements about life that people often feel differently about. Please show how much you think each one is true about you by placing a tick in the block to show your answer. Give your own honest opinions…… There is no right or wrong answers.		Not at all true	A little true	Quite true	Completely true
1	Most of my life gets spent doing things that are meaningful				
2	By working hard you can nearly always achieve your goals				
3	I don't like to make changes in my regular activities				
4	I feel that my life is somewhat empty of meaning				
5	Changes in routine are interesting to me				
6	How things go in my life depends on my own actions				
7	I really look forward to my work activities				
8	I don't think there is much I can do to influence my own future				
9	I enjoy the challenge when I have to do more than one thing at a time				
10	Most days, life is really interesting and exciting for me				
11	It bothers me when my daily routine gets interrupted				

12	It is up to me to decide how the rest of my life will be				
13	Life in general is boring for me				
14	I like having a daily schedule that doesn't change very much				
15	My choices make a real difference in how things turn out in the end				

ADDENDUM H – The Dispositional Resilience Scale scoring sheet.

	Below are statements about life that people often feel differently about. Please check a box to show how much you think each one is true for you. Give your own honest opinions…There is no right or wrong answers!	What is being measured	Not at all true	A little true	Quite true	Completely true
1	Most of my life gets spent doing things that are meaningful	CM				
2	By working hard you can nearly always achieve your goals	CO				
3	I don't like to make changes in my regular activities	CH (-)				
4	I feel that my life is somewhat empty of meaning	CM (-)				
5	Changes in routine are interesting to me	CH				
6	How things go in my life depends on my own actions	CO				
7	I really look forward to my work activities	CM				
8	I don't think there is much I can do to influence my own future	CO (-)				
9	I enjoy the challenge when I have to do more than one thing at a time	CH				
10	Most days, life is really interesting and exciting for me	CM				
11	It bothers me when my daily routine gets interrupted	CH (-)				
12	It is up to me to decide how the rest of my life will be	CO				
13	Life in general is boring for me	CM (-)				
14	I like having a daily schedule that doesn't change very	CH (-				

	much	)				
15	My choices make a real difference in how things turn out in the end	CO				

SCORES ARE REVERSED ON SIX NEGATIVELY KEYED ITEMS: 3, 4, 8, 11, 13, 14
CM = COMMITMENT = SUM (1+4+7+10+13)
CO = CONTROL = SUM (2+6+8+12+15)
CO = CONTROL = SUM (3+5+9+11+14)
TOTAL HARDINESS-RESILIENCE SCORE = SUM(CM+CO+CH)

ADDENDUM I – Published studies that used the Dispositional Resilience Scale.

Stern, S.B. Rohner, R.P., and Sacks-Stern, B.J. 2007. Relations of self-reported material acceptance and behavioural control with acting-out aggressive behavior in children diagnosed with ADHD. *Psychological Reports,* 101(3): 675-684.

Staats, S. Cosmar, D., and Kaffenberger, J. 2007. Sources of happiness and stress for college students: A replication and comparison over 20 years. *Psychological Reports,* 101(3): 685-696.

Klieger, D.M., and Johnson, H.K. 2007. The social phobia and anxiety inventory: problem of underlying medical conditions. *Phychological Reports,* 101(3): 697-706.

Addendum J: List of minimum equipment for rescue operations

Equipment for rescue operations	Airport category			
	1-2	3-5	6-7	8-9
Adjustable wrench	1	1	1	1
Axe, rescue, large non wedge type	1	1	1	1
Axe, small non-wedge type or aircraft type	1	2	4	4
Bolt cutter (61 cm)	1	1	1	1
Crowbar (95 cm)	1	1	1	1
Crowbar (1.65 m)	-	-	1	1
Cold chisel (2.5 cm)	-	1	1	1
Flashlight	2	3	4	8
Hammer (1.8 kg)	-	1	1	1
Grab hook	1	1	1	1
Saw, metal cutting or hacksaw, heavy duty with spare blades	1	1	1	1
Fire resistant blanket	1	1	1	1
Ladder	-	1	2	2 or 3
Rope line (15 m)	1	1	-	-
Rope line (30 m)	-	-	1	1
Pliers (17.8 cm) side cutting	1	1	1	1
Pliers, slip joint (25 cm)	1	1	1	1
Screwdrivers, assorted set	1	1	1	1
Snippers, tin	1	1	1	1
Chocks (15 cm high)	-	-	1	1
Chocks (10 cm high)	1	1	-	-
Powered rescue saw complete with two blades; or pneumatic chisel complete – plus spare cylinder, chisel and retaining spring.	1	1	1	2
Harness cutting tool	1	2	3	4
Gloves, flame resistant pairs, unless issued to individuals.	2	3	4	8
Breathing apparatus and cylinders	-	2	3	4
Spare cylinders	-	2	3	4
Hydraulic or pneumatic forcing tool	-	1	1	1
Medical-First aid bags	1	1	1	1

Source: ICAO Doc 9137-AN/898

Addendum K: List of company procedures governing aerodrome rescue fire fighting at ACSA owned/operated airports.

1. Runway/taxiway inspections (ACSA Procedure C020 001M)

This procedure covers and details the activities to be carried out by ACSA Fire and Rescue personnel when undertaking scheduled and ad-hoc runway and taxiway inspections on ACSA operated airports to ensure that runways and taxiways conform to the safety requirements as documented by ICAO in order to prevent incidents, accidents or damage to aircraft.

2. Radio procedures (ACSA procedure C010 002M)

This procedure details the rules to be followed by ACSA ARFF members when communicating via radio to ensure that radio communications are initiated, maintained, easily understood and managed in an orderly manner to prevent unnecessary radio transmissions, especially in the event of an emergency.

3. Escorting of aircraft (ACSA Procedure C020 003M)

This procedure covers all of the activities carried out when escorting aircraft on movement areas to provide a safe and efficient service to airlines, aircraft owners or aircraft operators when it is required that an aircraft e escorted on the movement area.

4. Rescue from Civilian Aircraft (ACSA procedure C060 005M)

This procedure details the rules applicable to all aspects of rescue of occupants from all aircraft to effectively plan and manage all rescue operations, whilst permitting the safe evacuation of aircraft occupants.

5. Provision of fire cover for aircraft (ACSA procedure C020 004)

This procedure covers action to be followed for the provision of fire coverage for aircraft to ensure that by providing fire cover, the safe operation is maintained.

6. Fire fighting extinguishing media (ACSA procedure C050 003)

This procedure covers details and the activities required when calculating the provision of fire fighting extinguishing media to ensure that adequate fire fighting extinguishing media is available for any aircraft emergency.

7. **Level of protection: rescue and fire fighting to be provided at ACSA airports (ACSA procedure C060 001M)**

This procedure details the rules applicable to all emergency call out procedures and response activities when dealing with any accidents and incidents to ensure that by the use of a structured call out procedures that all ACSA Fire and Rescue Services resources provided in response to any emergency are both timely and effective.

8. **Marshalling of aircraft (ACSA procedure C020 006).**

This procedure covers and details the activities to be carried out when marshalling aircraft to ensure that aircraft is marshalled safely and without any occurrence into or out of its parking stand.

9. **Runway Visual Range (RVR) measuring and monitoring (ACSA procedure C020 011M)**

This procedure details the rules applicable to all activities whilst carrying out RVR monitoring and measuring to ensure the safe landing, taxiing and take off of aircraft.

10. **Fire tender training and testing (ACSA procedure C030 006M)**

This procedure details the rules to be adhered to by all fire fighters involved in the training and testing for fire tender license to provide an efficient and effective response with operation of the fire tender in the event of an emergency on ACSa airports.

11. **The monitoring, handling and control of dangerous goods (ACSA procedure C020 010M)**

This procedure details the rules applicable to activities when faced with any dangerous goods transported by air, road or rail to ensure that the Airport Fire Fighting and Rescue Service effectively deal with all dangerous goods they may be faced with on all ACSA operated airports.

1. Scope

This procedure covers and details the activities to be carried out by ACSA Fire and Rescue Officers when undertaking scheduled and ad-hoc runway and taxiway inspections on ACSA operated airports.

2. Objective

To ensure that, the runways and taxiways on all ACSA operated airports conform to the safety requirements for pavement surfaces as documented by ICAO in order to prevent incidents, accidents or damage to aircraft.

In addition, general inspections of any construction work taking place within the manoeuvring area must be undertaken to ensure that safe work procedures are being used and that no obstructions or unsafe situations could arise for aircraft movements in the vicinity.

3. Definitions and Abbreviations

ATC:
Air Traffic Control

ACSA Fire and Rescue Inspection Team:
Consists of an ACSA Fire and Rescue Officer, ACSA Safety Officer and an ACSA Maintenance and Engineering representative

Corrective Action: (Reactive approach)
This is the action taken to put measures in place to prevent a non-conformance from occurring again

Inspections:
Reference to inspections in this procedure include the manoeuvring area and rapid exit taxiways

Manoeuvring Area
This is the part of an aerodrome for surface movement of an aircraft used for the take-off, landing and taxiing of aircraft.

Movement Area
That part of an aerodrome for surface movement of an aircraft used for the take-off, landing and taxiing of aircraft, consisting of the manoeuvring area and the aprons

Non-conformance :
This includes any deviation from standards, procedures, practices that could either directly or in-directly lead to injury, illness, and property damage, damage to the workplace environment or a combination of these.

Preventative action: (Pro-active approach)
Anticipating what can go wrong and putting actions in place to avoid this from happening.

RET:
Rapid Exit Taxiways

SA –CAA :
SA Civil Aviation Authority