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Interventions which promote mental health among rescue workers: an integrative literature review

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INTERVENTIONS WHICH PROMOTE MENTAL HEALTH AMONG RESCUE WORKERS: AN INTEGRATIVE LITERATURE REVIEW

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WITS
UNIVERSITY

A research report submitted to the
Faculty of Health Sciences, University of the Witwatersrand, Johannesburg
in partial fulfilment of the requirements for the degree
of
Master of Science in Nursing

Johannesburg, 2023

DECLARATION

I, John Fitzsimons, declare that this research report is my own work. It is being submitted for the degree of Master of Science (in Nursing) at the University of the Witwatersrand, Johannesburg. It has not previously been submitted for any degree or examination at this or any other university.



15th February, 2023

Protocol Number: W-CBP-210423-01

DEDICATION

I dedicate this work to my loving parents
Francis and Ursula Fitzsimons

In appreciation of the sacrifices they have made in order to make
my siblings' and my education a possibility.

ABSTRACT

Background: Rescue workers are at the forefront of humanitarian efforts during sudden-onset disasters and remain a high-risk group for post-traumatic stress-related disorders. This is due to the nature of rescue work as well as the unique hazards inherent therein. This study endeavoured to identify and describe interventions which can bolster the mental health fortitude of rescue workers and lead to more rewarding work and better mental health outcomes. The mental health of workers is of concern for occupational health practitioners.

Aim of study: To describe and synthesize interventions which positively impact the mental health and wellness of rescue workers.

Design: The guiding framework by Whittemore and Knafl (2005), was used in conducting an integrative literature review. The study included the following 5 stages: problem identification, literature search, data evaluation, data analysis and presentation of findings.

Method: Database searches were conducted in SCOPUS, PsycINFO, ProQuest, PubMed and EBSCOhost to identify studies in English including grey literature, from January 2010 to December 2019. A total of 241 papers were retrieved, with 74 of those being read in depth and 19 being selected based on the selection criteria.

Results: Five themes were identified during this study. Commitment to humanity, The intrinsic nature of rescue work, Rescue workers are also the survivors of trauma, Health related quality of life, and Mental health support.

Conclusion: A more proactive managerial involvement in the resourcing, training and support of rescue workers as well as a review of the policies surrounding their occupational conditions were factors which stood to potentially improve mental health outcomes. Occupational conditions included: length of shifts, the fostering of family and community support, and the integration and provision for leisure activities for their therapeutic benefit.

Keywords: rescue workers, mental health, interventions, review

ACKNOWLEDGEMENTS

My sincere and heartfelt gratitude goes to the following people through whom the study became possible:

- Ms Agnes Huiskamp, my study supervisor, for her patient support and guidance throughout the research. I feel that my life is all the better and richer for knowing her.
- Prof Shelley Schmollgruber, for her support, instruction and guidance in getting this work over the line.
- Mrs Angela Buitkovic, for her input and guidance with the theoretical and practical component of my post-graduate studies.
- Mr Devind Peters, librarian and a walking encyclopedia, for his enthusiastic and comprehensive support throughout this research.
- Prof Aronè Timoteo and the late Prof Estima for instilling a love for learning from an early age.
- To my family Francis and Ursula, Matthew, Abi and Lisa, Charlene, Nick and Akaashni, Adriyel and Daryen for all their loving support and prayers throughout this study.
- To my dearest, beautiful wife, Shanice, for her endless love, patience and support throughout.

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LIST OF ABBREVIATIONS

CASP	Critical appraisal skills programme
CEO	Chief Executive Officer
GERD	Gastroesophageal Reflux Disease
HRQOL	Health Related Quality of Life
MMAT	Mixed Method Appraisal Tool
PTSD	Post-Traumatic Stress Disorder
WHO	World Health Organization
WTC	World Trade Centre

CHAPTER ONE

SYNOPSIS OF THE REVIEW

1.1 INTRODUCTION

At the World Humanitarian Summit held in Turkey in 2016, the World Health Organization (WHO) raised the issue of humanitarian emergencies being on the rise; and worsening because of their increasingly protracted nature (WHO, 2015). Disasters such as hurricanes, earthquakes and terror attacks strike at any time or place, often with no forewarning, necessitating rescue workers to mobilise rapidly. This can disrupt their personal, social, and economic well-being (Florio and Bergman, 2019).

Rescue workers provide aid to those in need during emergencies, including firefighters, those who search for survivors, members of the police, medical doctors, and nurses. They comprise the frontline of humanitarian efforts in the aftermath of natural and sudden-onset disasters and acts of terror (Schreiber *et al.*, 2019; Brooks *et al.*, 2016). Exposure to traumatic events forms part and parcel of emergency response work and is a reality which increases the risk for adverse psychological health trajectories as compared to the population at large (Argenteiro and Setti, 2011; Counson *et al.*, 2019; Haleem *et al.*, 2017; Marks *et al.*, 2017; Skeffington *et al.*, 2016; Wild *et al.*, 2020). Considering the recent increase in both natural disasters and humanitarian crises globally, the impression that this leaves on rescue workers' psyche has attracted international attention (Brooks *et al.*, 2016; WHO, 2015).

The work and health interplay of these professionals is critical from an Occupational Health Nursing perspective because their service is essential in the aftermath of any disaster but done under highly stressful and dynamic conditions. Rescue workers will feature in ever-increasing roles in the future management of disasters, and as this specialised workforce grows, so will their mental health and wellness needs. Despite this, evidence regarding interventions which are protective of mental health and promotion of optimal psychosocial outcomes remains unclear and often conflicting. This study will endeavour to discover and understand factors and interventions commonly endorsed by literature to promote these workers' psychological wellness and synthesize knowledge on factors that could bolster their mental health.

1.2 BACKGROUND

Working at the fore of any aid or rescue effort can present a dynamic work environment as priorities evolve based on the moment's need. Disaster response teams can comprise professional and volunteer workers with diverse experience levels. Often, in the immediate disaster aftermath, because life-saving efforts are critical, rescue workers may be allocated roles for which they do not feel trained (Brooks *et al.*, 2020). While working at ground zero, they are frequently exposed to traumatic events, which include injuries to large numbers of victims such as fires or traffic accidents, minors and burns victims, as well as violent incidents and murder scenes (Argentero and Setti, 2010). The disruptive nature of the disasters can produce undue stress and leave rescue workers feeling inadequate and overwhelmed with the belief that "one's best is not enough" (Florio and Bergman, 2019: 800). Rescue missions are physically demanding. However, they can also become an interplay between psychosocial demands and resources (Brooks *et al.*, 2016). These emergencies can also pose specific health risks due to increased violent attacks on humanitarian and rescue workers in conflict zones. Rescue workers have lamented a dearth of training in coping with the stressors associated with their occupation and the emotional tax inherent therein; consequently, they remain hidden victims of trauma, adversely affecting their psychological health (Yasien *et al.*, 2016).

Stressors are shown to be more acute while working near the epicentre of an event, soon after the event has occurred, and with limited supplies (Brooks *et al.*, 2020; Motreff *et al.*, 2020; Florio and Bergman, 2019). Workers may be paired with unfamiliar colleagues, which can lead to role ambiguity and the potential for inter-group conflict, while poor organisational or leadership support, uncertain or unsafe working conditions on the ground and irregular sleep may also exacerbate burnout (Saijo *et al.*, 2017; Brooks *et al.*, 2020; Brooks *et al.*, 2016; Florio and Bergman, 2019). Concurrently, personal traumas, such as recent life-changing events or a pre-deployment psychiatric history, can be brought to the fore under these circumstances and pre-dispose rescue workers to post-disaster mental health challenges.

1.2.1 Impact of Rescue Work on Mental Health

Providing aid and support to people in need or emergencies can have intrinsic value and bring occupational satisfaction. However, "caring professions" can cost the employee's physical and mental health (Counson *et al.*, 2019). Rescue worker puts their safety at risk to preserve the life of others (Haleem *et al.*, 2017). According to Argentero and Setti (2011), burnout is a characteristic form of occupational stress in rescue workers resulting from vicarious traumatization. Vicarious trauma takes place when the trauma experienced by victims impacts these workers and is accentuated by the feeling of being helpless to assist the victims. Workers with burnout have intrusive symptoms such as the increased beating of the heart when thinking about work or nightmares (Argentero and Setti, 2011). A study on firefighters revealed that they felt threatened by their inability to assist with the emotional or physical trauma of the victim (Skeffington *et al.*, 2016). Regular exposure to occupational trauma also predisposed rescue workers to develop psychological and physical illnesses like post-traumatic stress disorder (PTSD), depression and somatic symptoms (Counson *et al.*, 2019; Mäkinen *et al.*, 2015; Petrie *et al.*, 2018; Skeffington *et al.*, 2016). Notably, a meta-analysis conducted by Berger *et al.* (2012) found the global incidence of PTSD higher in rescue workers at 10% compared to the general population at 1.3%. While rescue workers dedicate their lives to assisting trauma victims, they are part of a high-risk group for adverse occupational mental health (Wild *et al.*, 2020).

Literature suggests that the symptoms associated with PTSD may be more prominent following large-magnitude events, occupational exhaustion, perception of personal harm, exposure to fatalities, failure to succour survivors, and vicarious identification with victims (Klimley *et al.*, 2018; Brooks *et al.*, 2016). Despite these challenges, professional rescuers have been shown to perform better than volunteers while preserving their work-related mental health (Brooks *et al.*, 2016). The mental well-being of these workers influences their families and the recipients of the relief they provide. It will ultimately determine the workers' ability and willingness to return to future deployments (Makinen *et al.*, 2015). Resilience is one key factor that may mitigate occupational stress's deleterious impact on mental health, with higher psychological resilience corresponding to better mental health outcomes (Denkova *et al.*, 2020; Marschall *et al.*, 2017). Pietratoni and Prati (2010) attributed this to training and learned coping through daily work and exposure, which suggests that resilience may be acquired and could produce a workforce that can be more

functional under trying working conditions. This highlights the beneficial role of psychosocial factors in determining mental health outcomes in these professionals.

1.2.2 Mental Health Promotion

The World Health Organisation is at the forefront of global responsibility for health and recognises the value of mental health. Health is "a state of complete physical, mental and social wellbeing", and this conceptualisation forms the basis of its activities (Burton, 2013; 15; World Health Organization, 2004). Mental health is essential for the harmonious integration of the individual into their community. The World Health organization describes it as "*a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community"* (World Health Organization, 2004).

In contrast, stress is conceptualised as any situation the individual experiences as overwhelming their resources and threatening their wellbeing (Haleem *et al.*, 2017). Within this context, resources are understood to mean possessions central to the person and promote their wellbeing; accumulation and protection of resources are protective against stress. Mental health can be viewed as individual capital, which can be enriched or impoverished through the milieu created by society and influencing the quality of life. Physical and mental health are interdependent, and it has been shown that chronic diseases are more often reported as challenging under adverse circumstances, including lack of employment opportunity, low socio-economic status, gender inequality or violations of human rights, and limited opportunity for continuous education.

Mental Health Promotion is included in the 2030 Agenda for Sustainable Development, and there have been impressive worldwide initiatives to advance all the elements of global mental health: promotion, prevention, treatment, rehabilitation, and recovery (United Nations, 2015). Occupation or work factors may cause or contribute to mental health problems such as burnout, anxiety disorders, depression and sleeplessness, which can aggravate gastrointestinal disorders, cardiovascular illness, and musculoskeletal disease, creating a social and economic burden on health and human services (Jané-Llopis *et al.*, 2005). One of the commitments arising out of the Ottawa Charter was promoting health through improving occupational conditions and the environment (World Health

Organization, 1986). Workplace health initiatives worldwide have evolved over the past several decades, emphasizing a deliberate shift from an almost exclusive focus on the physical impact of the work environment to include the psychosocial (Constitution of the World Health Organization, 2020). However, during the United Nations General Assembly held in October of 2015, it was highlighted that parity between mental and physical health has not yet been achieved, and it remains a significant human development challenge (United Nations, 2015).

Mental health and illness are not perceived as residing within the scope of traditional public health, so the communal potential for improving it is not fully exploited with the result that interventions are curative rather than preventive, adding to the burden of Mental health globally (WHO, 2020). It is pertinent that mental health accounts for most of the sick leave taken in most developing countries today (Harvey *et al.*, 2009). According to Joyce *et al.* (2015), depression and anxiety disorders are the primary factory in long-term occupational incapacity in developed countries.

Professions with high trauma exposure, such as emergency service work, are considered to have elevated risk and are the most impacted (Petrie *et al.*, 2018). Occupational stress may be alleviated by interventions directed at the coping ability of the employee and the working environment (Jané-Llopis *et al.*, 2005). However, WHO Healthy Workplace Framework and Model (Kortum, 2013), highlights that there are currently no International Labour Organisation (ILO) conventions or International Organisation for Standardisation (ISO) standards dealing with psychosocial hazards in the workplace, nor are definitions of psychosocial hazards provided (Burton, 2013). While research has shown the negative impact of critical incident stress on rescue workers, specific and compelling measures to protect against this stress have not been developed (Matsuoka *et al.*, 2011). The occupational hazards of rescue work on mental health are common knowledge. However, current interventions or policies to protect this group lack substantive scientific grounds and may not be based on empirical evidence (Marks *et al.*, 2017). For continuity in care and relief to victims of natural or manufactured disasters, it is more important than ever that the mental health of rescue workers be monitored and that a continuum of apt interventions is available to support them (Schreiber *et al.*, 2019).

1.3 PROBLEM STATEMENT

First responders, including police, fire, ambulance, rescue and other emergency services personnel, are at a significantly increased risk of experiencing poor physical and mental health (McKeon *et al.*, 2019; 1). From occupational health and occupational health nursing perspective, the holistic health of workers needs to be addressed. Thus, mental health must be attended to through preventative and promotive health interventions. The literature reveals studies focusing on emergency service organisations' mental health interventions. However, these findings were often vague, not definitive, and sometimes conflicting. To promote good practice in occupational health nursing, synthesising the existing studies' findings is essential. This study will thus explore what the literature says regarding interventions that can enhance rescue workers' mental health.

1.4 RESEARCH QUESTION

What are the mental health promotion interventions which can positively impact the mental health of rescue workers?

1.5 STUDY PURPOSE AND OBJECTIVE

The **purpose** of the integrative review is to investigate and evaluate evidence within the literature pertaining to the interventions for the promotion of the mental health of rescue workers.

The **objective of the study aims to describe interventions that** contribute to the positive mental health and wellness of rescue workers.

1.6 MOTIVATION AND RATIONALE OF STUDY

This preliminary literature study has found an increase in SODs internationally and a growing awareness of the hazards that rescue work pose to the mental health of rescue workers. From an occupational health nursing perspective, it is essential to understand the interaction between this work and the mental health of rescue workers to enable a holistic approach to any health-promoting interventions. This study will search the literature for the

latest evidence on interventions that are protective and promotive of mental health amongst these workers. This information could potentially inform evidence-based practice (EBP) within occupational health nursing.

1.7 KEY CONCEPTS

For this study, the following terms will be defined as follows:

Disaster- events which occur with little or no warning, are disruptive to the functioning of communities and lead to loss of human lives and material, economic or environmental resources (Norton *et al.,* 2013).

Intervention- an action taken or implemented to raise awareness, help or improve a situation or clinical outcome, including a teaching moment or treatment aligned with evidence-based practice (Farrell et al., 2017; Acutt and Hattingh, 2016; Simpson, 1991).

Mental health- A state of wellbeing of a person who has insight into and understanding of their abilities and limitations, the able to cope with daily stress, work productively, and contribute to the wellbeing of their fellow workers, family, or community (Acutt and Hattingh, 2016; 320).

Psychosocial determinants- pertaining to workplace organisation and culture on the individual and its effect on relationships and behaviour (Burton 2013;15).

Rescue Workers- a heterogenous group of people trained to safeguard the community and simultaneously handle life and trauma exposure, and sets them apart from the population (Kimley *et al.,* 2018).

Resilience- training and learned coping with daily work may explain lower psychological vulnerability in professionals, a positive outcome of exposure to Disaster work (Brooks *et al.,* 2016).

1.8 OVERVIEW OF THE RESEARCH METHOD AND DESIGN

This study was conducted using the integrative literature review method, which is non-experimental and based on the framework by Whittemore and Knafl (2005). This methodology helped summarize past research, providing the most comprehensive understanding of the phenomenon of interest and representing the state of current research literature (Souza *et al.*, 2010; Whittemore and Knafl, 2005; Russel, 2005). Because of its varied sampling method, the integrative review methodology allowed the inclusion of findings from empirical and theoretical literature (Souza *et al.*, 2010; Whittemore and Knafl, 2005). This study aimed to identify factors that determined mental health among rescue workers and necessitated a wide literature search across diverse studies. The framework included the following five (5) stages as described in Whittemore and Knalf (2005):

- Problem identification stage
- The literature search
- Data evaluation and collection
- Data analysis
- Presentation of finding

Before the study could begin, the research proposal was presented virtually to a panel of peer reviewers for input and approval from the Department of Nursing, School of Therapeutic Sciences, Faculty of Health Sciences at the University of the Witwatersrand. This was granted by the Health Sciences research committee. An Ethical Clearance (Waiver) was obtained from the Human Research Ethics Committee, with protocol number: **W-CBP-210423-01.**

1.9 OUTLINE OF THE STUDY

The research study is organised into five chapters.

This study's layout used the 5-stage review process designed by Whittemore and Knafl (2005). The study comprised five chapters, as summarised below.

Chapter One discusses how the research problem was identified and formulated. It discusses the aim of the study, and gives a short overview of the methodology used for the integrative review.

Chapter Two discusses the literature search, and the collection of the data. This chapter also comprises well-discussed research methods and databases used, eligibility criteria, the search strategies used and processes, followed by how the documentation and selection processes were carried out.

Chapter Three discusses the procedure taken to evaluate data using quality appraisal and extraction techniques and the methodological rigour used for the study. It also includes the stages used to analyse data by reduction, display, comparison, verification and conclusion from the primary studies.

Chapter Four describes and narrates the results as discussed. The final discussion in the chapter is the measures taken to ensure the thoroughness of the study.

Chapter Five, the last chapter, discusses discussions, findings, and conclusion, including limitations and recommendations.

1.10 SUMMARY

The opening chapter presented an overview of the study and included the introduction, background, problem statement, aim and significance of the study. The methodology and layout of the study were introduced, and key concepts were defined. The next chapter will discuss the literature search stage of the review.

CHAPTER TWO

LITERATURE SEARCH

2.1 INTRODUCTION

This chapter outlines the Integrative literature review as the methodology chosen for this study. The rigor of the integrative review as a methodology is highlighted as the problem identification, and more specifically, the literature search steps are defined, unpacked, and expanded. Finally, this chapter shows how this research study employed the integrative literature review methodology.

2.2 THE INTEGRATIVE LITERATURE REVIEW AS A METHOD

While the demand for evidence grows with each medical development, systematic reviews proliferate with a specific focus on randomised control trials (Evans and Pearson, 2001). As a result, research methods more fitted to the nursing sciences, such as interpretive, observational, and descriptive studies, have often been excluded from reviews as `low-level' evidence (Evans and Pearson, 2001; 593). While systematic reviews are essential for evidence-based practice, they may not cover the depth and breadth of nursing research. Meta-analyses allow an objective approach to the appraisal of evidence, however, they are not fitting for research topics with less evidence, and this is where the integrative literature strategy is an apt methodology (Beyea and Nicoll, 1998). The integrative literature review is a non-experimental, qualitative research method and is based on the framework by Whittemore and Knafl (2005). As a methodology, the integrative review has many advantages (Russel, 2005; 1), such as:

- Evaluating the strength of the scientific evidence,
- Identifying gaps in current research,
- Identifying the need for future research,
- Bridging between related areas of work,
- Identifying central issues in an area,
- Generating a research question,
- Identifying a theoretical or conceptual framework
- Exploring which research methods have been used successfully.

An integrative review, done rigorously, can have the same level of evidence as a primary study with regard to transparency, diligence, and replicability (Beyea and Nicoll, 1998; 877). Furthermore, the review can have a varied sampling method which allows the inclusion of findings from the empirical and theoretical literature, making it a unique tool in healthcare for evidence-based practice (Souza *et al.*, 2010; Whittemore and Knafl, 2005). Evidence-based practice is an approach to clinical care substantiated by scientific evidence and knowledge of the quality of that evidence (Souza *et al.*, 2005; 102). By systematically appraising and condensing research literature, the integrative review presents ongoing evidence within a field of knowledge and help one remain informed on best practice (Russel, 2005). During an integrative review, threats to validity must be considered to maintain the scientific integrity of the methodology. Russel (2005) notes that the integrative review methodology duly requires meticulous and contemplative work to produce outcomes that may contribute to practice.

This study aimed to identify factors which determine mental health among rescue workers. The integrative literature review methodology provided the most comprehensive understanding of this phenomenon because it facilitated a broad search for evidence across diverse study types (Whittmore and Knafl, 2005).

The integrative review methodology proved a valuable guide throughout this study in maintaining scientific rigor and mitigating threats to the validity of the findings. The five (5) stages of the integrative literature review helped source the relevant literature and prepare the findings for presentation. A summary of the stages of the integrative review employed in the study is depicted in **table 2.1.**

Table 2.1: Integrative literature stages (Whittemore and Knafl, 2005)

Stage	Purpose	Application
Problem identification	The well-defined problem for review	Focused research question: *"What are the mental health promotion interventions that can positively impact rescue workers' mental health from January 2010 to December 2019?"*
Literature search	Identify relevant literature with a representative sample	Searched the following databases: ClinicalKey, PubMed, PsycINFO, and ProQuest. Health source: Nursing and Google Scholar. Ancestry search from approved article bibliographies.
Data evaluation/ Collection phase	Precise collection of pertinent data, evaluate the quality of the evidence, ensuring rigor	Appraisal of literature using approved evaluation tools: MMAT developed by Pluye and colleagues (2018) and (CASP, 2018) with the help of 2 independent reviewers
Data analysis stage	Unbiased interpretation of data and synthesis of evidence	Data reduction, display, comparison and analysis or key variables, topics, and subgroups
Presentation	Conceptualize the expanse of the research topic	Disclose conclusions and biases encountered (Russel, 2005) evidence that conclusions do not exceed evidence (Whittemore & Knafl, 2005)

Stage 1: Problem Identification

The initial stage of the review method is selecting a well-defined problem for review; this must have a clear focus and purpose to streamline the selection of pertinent information from primary sources during the data extraction stage (Whittemore and Knafl, 2005; Russel, 2005). According to Souza *et al.* (2010), defining the guiding question is paramount to the review because it determines the type of data sources which will be consulted and which information will be gathered from each source. A preliminary review of the literature revealed the impact rescue work has on the mental health of rescue workers and the dearth of conclusive evidence on protective and preventive interventions which can bolster the mental health of these professionals. The research problem emerged during a discussion with the study supervisor and followed a preliminary review of rescue work's impact on health in

general. The study supervisor was consulted and suggested the use of the problem-intervention-comparison-outcome (PICOT) guidelines in formulating the following focused research question:

> *"What are the mental health promotion interventions that can positively impact rescue workers' mental health from January 2010 to December 2019?"*

Stage 2: The Literature Search

The literature review is the process of introduction to current information on a topic (Beyea and Nicoll, 1998). The integrative literature review draws data from the body of literature on a given topic, and allows for the synthesis of new evidence; this body of literature is comprised of studies on the same or similar topic (Beyea and Nicoll, 1998). Data collection is the method of finding published and unpublished literature and evaluating its eligibility for the study (Dickersin *et al.*, 1994; 309). Ideally, the researcher gathers as many pertinent studies on the topic as are available with particular care to discard irrelevant material that may have been retrieved using search terms and filters. Inadequate sampling threatens the validity of any research, and the researcher must consider and describe why specific data may not have been included in a study (Russel, 2005). Search criteria must comply with the research question and represent the sample of interest for the study (Souza *et al.*, 2010). Computerized databases are efficient and effective data sources, but they have limitations due to specific indexing of search words and may yield only 50% of relevant literature (Conn *et al.*, 2003; Dickersin *et al.*, 1995). Conn et al. (2003) suggest accessing the maximum number of eligible primary sources through ancestry searching, journal hand searching, networking, and research registries for a comprehensive literature search. Ancestry searching is done by systematically searching citations from studies included in the review, potentially increasing the resource yield; however, it may be biased towards retrieving similar studies (Conn *et al.*, 2003). Bias favour a predetermined perspective, affecting the ability of the reader to consider a question objectively (Toronto and Remington, 2020). A comprehensive review comprises articles spanning different samples, ages, genders, races, and methodologies, which increases generalizability because the reviewed literature is more likely to represent the target population (Whittmore and Knafl, 2005).

To ensure reliable results, any search criteria used should represent the sample group the researcher hopes to represent (Souza *et al.*, 2010; Russel, 2005). A discrepancy between collected studies and the population of interest threatens the study's validity during the literature search stage; the researcher must thus evaluate how studied factors differ from those in the target population (Whittemore and Knafl, 2005). Grey literature is another important source of information, especially since this is often not found in database searches due to publication bias (Hopia *et al.*, 2016). Conn *et al.* (2003) caution against only reviewing literature which is easily accessible and recommend a broader search for a more balanced yield of literature results. In an updated review of the integrated review methodology, it has been suggested that building a team for the literature search stage of the study can enhance quality control, especially in the coding process (Hopia *et al.*, 2016). Conn *et al.* (2003) demonstrated in a study how experienced librarians found up to 50% more related articles on a database search when compared to regular users. Torronto and Remington (2020) also advocate the value of enlisting the services of a librarian who can assist in a broader, more comprehensive literature search, reducing the risk of bias and increasing the rigor of the methodology.

2.3 SEARCH METHODS

2.3.1 Eligibility Criteria

One of the distinct advantages of the integrative literature review is its varied sampling method which allows a broad data search across empirical and theoretical literature (Evans and Pearson, 2000; Souza *et al.*, 2010; Whittemore and Knafl, 2005). Since a comprehensive review needs to identify the maximum number of sources, it will be necessary to supplement this search with ancestry searching, journal hand searching, networking, and searching research registries (Conn *et al.*, 2003). To represent the expansive nature of the available data, all relevant studies should ideally be included in the review; however, due to time constraints, inclusion and exclusion criteria must be adopted in agreement with the research question (Souza *et al.*, 2010). Conn *et al.* (2003) recommend a staged approach to determine studies that are eligible for the review, whereby reports are searched by title and abstract for potentially relevant studies; further eligibility can then be determined after a review of the entire report, and finally, reviews are included when they are determined to be helpful to the study. Following consultation with the study supervisor, it was suggested that a literature

search be initiated in PubMed and SCOPUS databases which are likely to have evidence pertinent to the research. The literature searches for data relevant to this study was tentatively initiated using the following inclusion and exclusion criteria:

Table 2.2: Criteria for inclusion and exclusion

Criteria	Inclusion	Exclusion
Type of study and design	All empirical (qualitative, quantitative, and mixed methods); theoretical literature published and unpublished literature	Literature reviews, editorials, book reviews, systematic reviews
Concept	mental health promotion, resilience training or interventions, rescue workers, sudden onset disaster and terrorism	
Phenomenon of interest	Interventions which enhance mental health, practices to improve resilience, training on coping, and coping mechanisms.	
Population/type of participants	Professional rescue workers: firefighters, police, doctors, nurses, paramedics, and ambulance drivers.	Volunteers, first responders, stander by civilians
Setting/ Context	Natural or manufactured disasters, sudden onset disasters	Land or sea search and rescue
Language	English	Any other language
Publication year	2010-2019	Before 2009

2.3.2 Information Sources and Search Strategy

Before conducting the systematic and detailed literature review, a preliminary search was done to determine the usability and efficacy of the key search terms. The main concepts used were: Mental health promotion, sudden onset disasters and rescue workers. Different combinations of these terms were entered in the PubMed and SCOPUS databases to identify indexed key terms.

An extensive and systematic search was conducted to find relevant literature over a period of ten (10) years. The search was conducted between February 1, 2021, to July 31 2021. Two methods were used to collect relevant data:

1. Articles from a computer-based database search.
2. Articles were searched from reference lists of articles from previous searches.

Upon consultation with an experienced Librarian from the WITS Medical library, the Academic Search Complete (EBSCO) and Grey Matters databases were added as search databases; Academic Search Complete for its broad collection of academic resources and periodicals and Grey Matters for its practicality in searching grey literature in the health sciences. The database searches and the ancestry searches were conducted using the Wits Health Sciences online databases, and these were supplemented using Google scholar wherever full-text data was not found.

2.3.2.1 Databases.

"A database is an electronic, searchable collection of published materials, including journal articles, book chapters, reports, dissertations, and conference proceedings. Each database indexes a distinct set of resources and discloses information about those resources" (Pannucci and Wilkins, 2010; 25). Computer databases, such as MEDLINE, CINAHL, and PsycINFO, are common starting points for Nurse researchers; however, the search should not be limited to these alone because they may yield a biased sample of existing research or reports which have positive results (Conn *et al.*, 2003; Dickersin *et al.*, 1995; Whittemore and Knafl, 2005). One of the main advantages of the integrative review is its ability to provide a more comprehensive summary of existing knowledge than other types of reviews, which necessitates a search for grey literature (Hopia *et al.*, 2016). Grey literature may not be published and can include research reports, conference abstracts, policy documents, theses, and dissertations (Dickersin *et al.*, 1995; 309). Grey literature minimises the risk of publication bias whereby reports may or may not be published because of the nature of study findings and can threaten the integrative literature review methodology (Russell, 2005). In order to provide a balanced review of existing theoretical and empirical studies, it is necessary to combine database searches with grey literature hand searches (Conn *et al.*, 2003; Hopia *et al.*, 2016). When deciding on appropriate databases to recruit relevant data

reports, the researcher consulted with the study supervisor and a librarian from the Health Sciences Library at the University of Witwatersrand.

Suggested databases used for the review included: PubMed, PsycINFO, and SCOPUS; the EBSCO host database was accessed through Academic Search complete, CINAHL, and Psychology and Behavioural Sciences Collection; furthermore, Medline was accessed through ProQuest. The World Health Organisation and Grey Matters databases were reviewed for grey literature, not excluding the grey literature available on the ProQuest database in the form of Theses, dissertations, and periodicals. Theses and dissertations often depict a more in-depth appraisal of current literature and may have more citations which can be helpful in the ancestry search phase of a review (Pannucci and Wilkins, 2010). These databases were likely to contain relevant literature on the research topic. SCOPUS covers 36,377 titles and is the largest abstract and citation database of peer-reviewed literature: scientific journals, books, and conference proceedings on life sciences, social sciences, and health sciences. The CINAHL database was searched for its comprehensive coverage of over 4600 journals on various nursing and allied health topics. PubMed is a search engine for biomedical literature that provides access to MEDLINE. This database contains bibliographic information on more than 32 million articles from more than 7,000 journals, including abstracts in the field of medicine, nursing, healthcare, and preclinical sciences (Fiorini *et al.*, 2017). PsycINFO is the leading database with information on social sciences, behavioural sciences, and psychology. The World Health Organisation maintains a set of data sources on global health and health promotion issues. Finally, ProQuest was consulted because of its grey literature content and diverse offering in scholarly journals, theses, dissertations, books, and newspaper articles.

2.3.3 Search Terms and Search Strings

Figure 2.2 depicts the search terms and subject terms used in the literature search. Inclusion and exclusion parameters helped identify pertinent literature relevant to the research topic. Search terms arose from the study's central concepts, including rescue workers, mental health promotion and sudden-onset disasters. The search terms were formulated in consultation with the research supervisor and included: Rescue workers, Mental health promotion and disasters. Other subject words which arose during the search included: psychological, humanitarian, terrorism, resilience training and coping. Truncation symbols

were used tentatively on specific terms to increase the yield of results, especially where the root word was part of the main subject or the research, such as: "promot*" instead of "promotion," "train*" instead of "training" or "terror" instead of "terrorism;" however these increased the retrieval of irrelevant studies and the natural language terms were used instead. The truncation symbol replaces the ending, or final letters, of a search term to capture all forms of that word (Pannucci and Wilkins, 2010).

The study supervisor and consulted librarian were essential in guiding the decision of what exact search strings would be used to conceptualise the appropriate theme for maximum search results. Some articles furnished synonymous terms for the concept of interest, which were later used in the search. Key words or concepts were linked and separated by Boolean terms (AND and OR). Figure 2.1 depicts the search string combinations used for the study.

("Mental health")
AND
(promotion OR protection OR training OR interventions OR factors)
AND
("sudden onset disasters" OR "natural disaster" OR "terrorism")
AND
("rescue worker" OR "police" OR "firefighter" OR "paramedic" OR "Nurse" OR "Doctor")

Figure 2.1: Search string used in this study.

2.3.4 The Search Process

The search process was discussed with the study supervisor to gain guidance on ensuring rigor and consistency throughout this crucial part of the study. An experienced librarian was also consulted on appropriate databases for pertinent studies and where best to search for grew literature to expand the breadth of the data. The detailed search employed the search strings in each database included in this study (refer to **figure 2.1**). The filters for the search were applied as discussed in the inclusion and exclusion criteria and included the date limit, language, and type of study. The search box Boolean term filters were set to "all fields." The WITS Health Sciences library recommended Zotero software which was used to document and save data retrieved during the search.

Finally, the detailed database search was supplemented by an ancestry search to ascertain the context of cited subjects or topics of interest within the article. The reference lists of reviewed articles were also scanned for titles that showed relevance to the review. Relevant titles were searched in PubMed; however, if full-text links were not found or available, the titles were searched in Google Scholar for hits. This consisted of searching reference list articles which were scanned for relevance or were for relevance by title. This staged approach was used to determine the eligibility of studies for inclusion in the review (Conn *et al.*, 2003).

2.3.5 Supplemental Search Methods

The Google Scholar search engine proved helpful in finding some previously missed articles in previous searches. The phrase "Factors which promote the mental health of rescue workers" was used.

2.3.6 Documenting the Search

The search was conducted using the search terms and eligibility criteria with the selected filters applied. The search filters included the year and language and excluded systematic reviews and meta-analyses. All results were saved separately in a folder with the respective research terms used on the Zotero reference manager tool.

Table 2.3: Summary of the Literature search

Database		Search String	Number of Articles found
SCOPUS (Advanced)		TITLE-ABS-KEY ((Mental health OR Psychological health)) AND TITLE-ABS-KEY ((promotion OR protection OR resilience)) AND TITLE-ABS-KEY ((disaster management OR sudden onset disasters)) AND TITLE-ABS-KEY ((rescue worker OR disaster responder OR first responder OR nurse OR fire fighter OR police OR doctor))	55
PsycINFO (basic Search)		(Mental health) AND (promotion OR protection OR training OR interventions OR factors) AND (sudden onset disasters) AND (rescue worker OR nurse OR fire fighter OR police OR doctor)	35
PubMed		(("mental health" [all fields] OR "coping" [all fields] OR "psychological" [all fields]) AND ("promotion" [all fields] OR "intervention" [all fields]) AND ("fire fighter" [all fields] OR "police" [all fields] OR "paramedic" [all fields] OR "rescue worker" [all fields] OR "doctor" [all fields] OR "nurse")) AND ("disaster" [all fields])))	2
ProQuest Nursing and Allied Health Database		("Mental health") AND (promotion OR resilience) AND (disaster) AND ("rescue worker" OR "disaster responder" OR "first responder")	63
EBSCOhost	Academic Search Complete (advanced)	(mental health or psychological health or wellbeing) AND (disaster management or emergency management or disaster relief) AND (rescue workers OR first responders)	21
	CINAHL (Basic)	(mental health or psychological health or wellbeing) AND (promotion OR protection OR training OR interventions OR factors) AND (sudden onset disasters or natural disaster or terrorism) AND (rescue worker OR nurse OR fire fighter OR police OR doctor OR first responder)	30
	Psychology and Behavioural Sciences Collection (advanced)	(mental health or psychological health or wellbeing) AND (disaster management or emergency management or disaster relief) AND (rescue workers OR first responders OR police OR fire fighters OR nurses OR doctors)	14
Hand searched Journal		The World Health Organisation	6

2.3.7 Search Outcome: Results from the Electronic Search

A total of 226 resources were retrieved from the systematic literature search strategy depicted in **table 2.3**. The resources comprised 220 (n=220) results from the database, and 6 (n=6) resources were retrieved from journal hand searches. An additional 15 articles were found from ancestry searches, as depicted in **figure 2.2**. To ensure rigor in the methodology, a thorough review of the articles was done with strict adherence to the inclusion and exclusion framework in collaboration with two independent assessors.

2.3.8 Selection and Screening Process

Whittemore and Knafl (2005) recommend that the literature search process for the review be chronicled, including the search terms, databases searched, and inclusion and exclusion criteria, all of which are well depicted in a decision tree. Diagramming enables readers of reviews to follow the flow of the methodology used by the author, which is an integral part of reporting reviews (Hopia *et al.*, 2016). Articles were first scanned for titles and abstracts because it was found during the preliminary search that title content can differ from abstract content; thus, both were read to avoid excluding potentially relevant articles based on the title. Articles were included or excluded based on the parameters from **table 2.2,** and both categories were documented (Pannucci and Wilkins, 2010). Citations with potentially relevant abstracts or titles were read in full to determine their relevance and usability for the study; this was carried out in collaboration with the supervisor. A third evaluator was consulted when the study supervisor and researcher differed in opinion about the applicability of an article. Irrelevant citations were excluded during this stage, and these were documented; the relevant citations' full-text articles were obtained an kept for future screening (Pannucci and Wilkins, 2010; Whittemore and Knafl, 2005). The search process was mapped using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) and is depicted in **figure 2.2.**

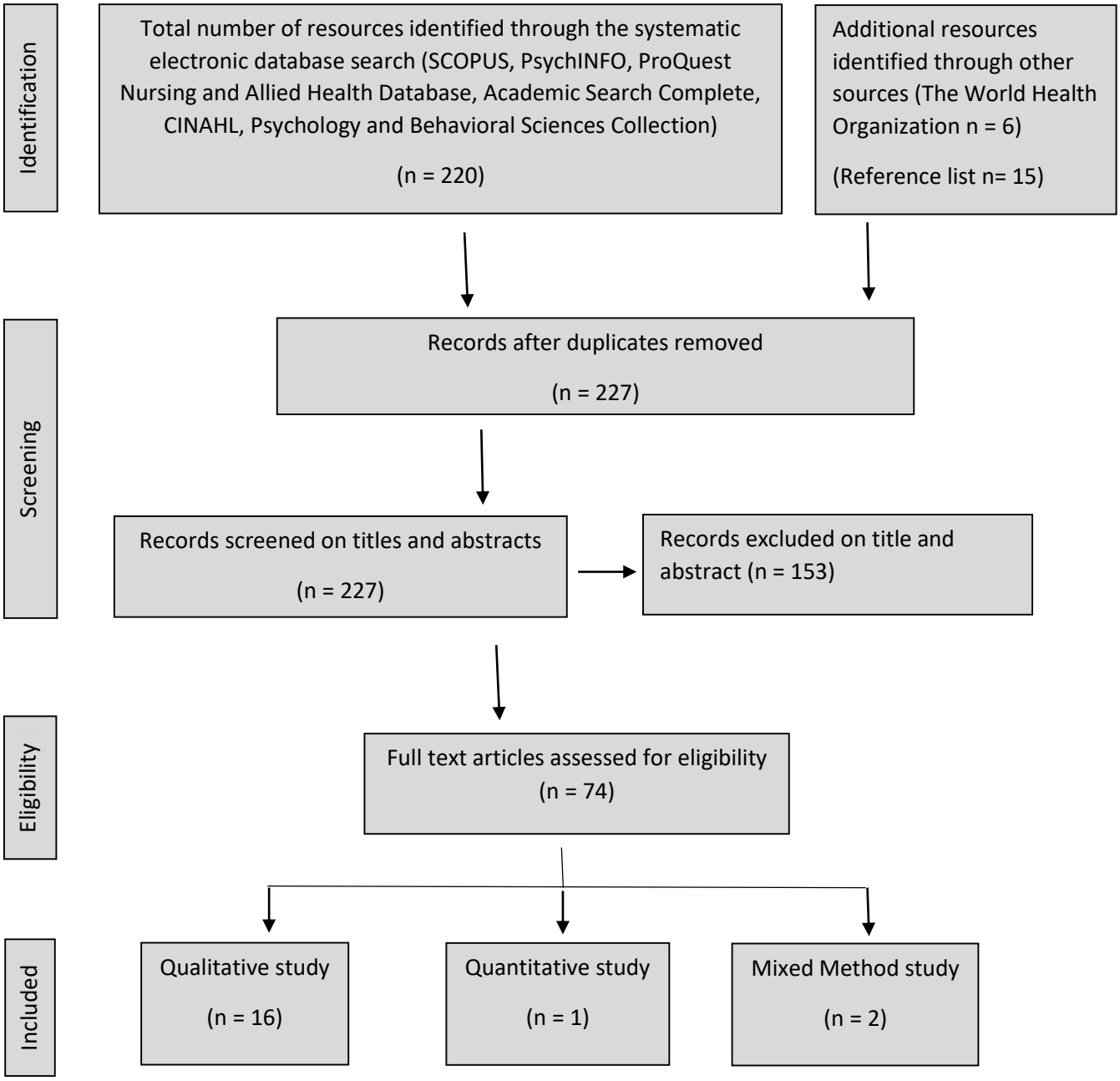


Figure 2.2: PRISMA flow chart depiction

2.4 REASONS FOR EXCLUSION

The inclusion and exclusion criteria provided objective criteria which guided the selection of resources for exclusion in the study. The reviewer and the review team, comprised of the study supervisor and an independent evaluator, initially arrived upon the exclusion criteria based on the research's aim and study problem statement. The exclusion criteria was

instrumental in narrowing the scope of the search to evaluate particulars potentially addressing the research question:

"What are the mental health promotion interventions that can positively impact rescue workers' mental health from January 2010 to December 2019?"

The first 14 duplicates were identified and excluded. A duplicate was defined as one paper concomitantly recorded in a given database more than once or other selected databases (Hopia *et al.*, 2016; 664). Articles were then scanned by title and abstract and citations that were deemed to be irrelevant and 153articles were excluded this way. Of the remaining 74 full text articles 8 were found to be reviews and a further 47 were excluded from a full article review where inclusion and exclusion criteria was strictly adhered to.

2.5 METHODOLOGICAL RIGOR

Integrative reviews are the most inclusive type of research review method, melding findings from experimental and non-experimental research to provide a more comprehensive understanding of a given phenomenon (Whittemore and Knafl, 2005; 547). Good evidence comes from the research method best adeptly and reliably answering the research question, notwithstanding maintaining scientific integrity requires prudent sensitivity to threats to validity (Evans and Pearson, 2000; Russel, 2005). Whittemore and Knafl (2005) propose using explicit and systematic methodology throughout the various stages of the integrative review to overcome the risk of bias.

2.5.1 Problem Statement

According to Souza and colleagues (2010), the problem statement or question is foundational to the research process because it assists in defining the representative population, possible interventions, and outcomes of interest to the study. A specific review purpose with clear variables of interest is integral to the success of other stages of the review because it helps to provide focus and boundaries, especially during the selection of pertinent and extraneous information in the data extraction stage (Whittemore and Knafl, 2005). The PICO tool was used to guide the formulation of a sensitive yet specific research question.

2.5.2 Literature Search: Search Strategies

The literature search is intricately related to problem identification, and a rigorous search strategy must be in place to ensure the accuracy of results. The literature search is not without threats to validity and include: inadequate sampling, insufficient resources retrieved during the search, a lack of representativeness of the sample, a discrepancy between the sample of the population represented within the retrieved studies and the population of interest (Souza *et al.*, 2010; Whittemore and Knafl, 2005). A precise literature search strategy is critical for augmenting the rigor of the review and can decrease the potential for inaccurate results (Conn *et al.*, 2003; Whittemore and Knafl, 2005). Souza *et al.* (2010) recommend a broad and diverse search to assure representativeness from sources that include electronic databases, manual journals, reference lists and unpublished material. In order to ensure a thorough search, a preliminary literature search was done in the MEDLINE and EBSCO host databases to create a database of search and indexed terms. The search strategy was discussed with the study supervisor and consulted librarian, and both provided guidance on the appropriate databases for the final literature search.

2.6 SUMMARY

This chapter discussed in detail the literature search stage of the integrative literature review methodology by Whittemore and Knafl (2005). The problem identification stage was introduced as integral to the success of the integrative review, specifically regarding the role of the research question or problem statement in guiding a comprehensive and adequate literature search. The literature search process was defined along with each step in this stage, and measures were observed to ensure rigor throughout and reduce risks to validity. The literature search stage comprised the search methods, eligibility criteria and inclusion and exclusion criteria, information sources and databases, selection strategies and the documentation of each of these components.

The next chapter describes and discusses the integrative review's data evaluation and data analysis stage.

CHAPTER THREE

DATA EVALUATION AND DATA ANALYSIS

3.1 INTRODUCTION

This chapter focused on the evaluation stage of the review. Relevant data was collected from the reviewed literature, and the quality of the data was considered. Finally, the chapter explored the data analysis stage concerned with a detailed and impartial interpretation of primary sources and the synthesis of evidence. Measures to ensure the rigor of the methodology uses are discussed throughout.

3.2 DATA EVALUATION

The data evaluation stage of a study forms the third stage of an integrative literature review. After a comprehensive literature review, the researcher gathers common data from included studies and judges the quality and level of evidence embodied within each source. This study stage can be complex and prone to error and bias. It is vital to maintain rigor and consistency during the data evaluation stage because it is crucial for the scientific integrity of a review (Beyea and Nicoll, 1998; Souza *et al.*, 2010; Whittemore and Knafl, 2005). The data evaluation stage is comprised of the extraction and appraisal of data. Due to the complexities inherent in both processes, the research supervisor suggested that it would be apt to explain each component individually. This chapter was duly sub-categorized into:

i) Data Extraction Stage
ii) Data Appraisal Stage

3.2.1 Data Extraction Stage.

According to Whittemore and Knafl (2005), data extraction is a process whereby specific methodological features and data are extracted from primary sources for later appraisal and evaluation. A review matrix can be tabular, including rows and columns that condense and sort results, detailing and summarizing significant findings from published research or scholarly articles (Toronto and Remington, 2010; Pati *et al.*, 2018). Abstracting data without discernment or relevant from extraneous data can produce a surplus of irrelevant

information, which may compound the analysis process. It is recommended to have a precisely defined research purpose and variables (Toronto and Remington, 2010). In the case of this study, data extraction included the tabulating of collected data into a data matrix created in the word processor Microsoft word. Data matrixes are essential for subsequent data appraisal because they facilitate the visual and systematic evaluation of the level of evidence embodied in an included study. During this stage, a data collection tool with a concise format is valuable in gathering consistent information from all data sources. Common study characteristics that form part of data collection tools include subject definition and sample size, methodology, measurement of variables, data analysis methods, and any conceptual frameworks or significant findings (Russel, 2005; Souza *et al.*, 2010).

In order to ensure the extraction of relevant data, minimize transcription errors and ensure precision in the checking of this data, it is recommended that a previously prepared instrument be used (Souza *et al.*, 2010; 104). A reliable data collection tool developed by Souza et al. (2010) was used for this study. Upon recommendation by the study supervisor, this tool was pilot tested to assess its usability for the study purpose prior to the data extraction process. This tool was used preliminarily to tabulate data from resources used during the research proposal for this study, and was instrumental in providing context when describing data display and presentation. The tool proved to be valuable in its ability to extract all relevant data necessary for the study. In order to maintain methodological rigor, the study supervisor served as an independent co-coder of the data from the included primary studies, using the data collection tool prescribed by Souza *et al.* (2010) **(Table 3.1).**

Data Matrix

Table 3.1: Characteristics of included studies

Qualitative Studies

	Author (s), Year of Publication	Title of Publication and Publication Type	Research Methodology Design	Aim and objective of Study	Population, Sample and Setting	Data Collection & Data analysis	Findings	Recommendations/ Limitations
1	Urrabazo, 2012	-ANXIETY, COPING, AND POST-TRAUMATIC STRESS DISORDER IN NURSES WHO CARED FOR VICTIMS OF HURRICANE KATRINA -Dissertation ProQuest.	-A non-experimental, cross-sectional, correlational survey research design. The study was retrospective, exploring events that took place 30-36 months prior to data collection	-To explore the relationships between anxiety, coping, and PTSD in nurses 30-36 months after providing care in New Orleans during and immediately after Hurricane Katrina.	-Sample of 91 English-speaking Nurses from New Orleans, Louisiana and the surrounding suburbs. Must not have been diagnosed with or treated for anxiety, depression of PTSD prior to Katrina. Snowball sampling.	-Data collection through completion of self-report questionnaire. -Multiple regression analysis.	-Nurses most reported buffer was social support. Talking with family and friends about their experiences, job training, and counselling /therapy/debriefing of some sort was negative correlated to PTSD. -Neither task-, emotion-, or avoidance-oriented coping mechanisms were found to mediate the relationships between state- or trait-anxiety and	**Consideration:** - Researchers need to continue to study nurses at various disaster sites, examining anxiety, coping, PTSD, and buffers used. -Longitudinal studies may strengthen the findings of this study. -It is also recommended that nurses from various types of disasters be studied in an attempt to determine if different disasters yield the same outcomes on mental health.

							PTSD in Hurricane Katrina nurses. - Anxiety levels and coping mechanisms are not major factors in predicting the development of PTSD in this sample of Hurricane Katrina nurses. -Taking time off was correlated with lower levels of PTSD symptoms.	**Limitation:** -When the study was conducted the hurricane led to a mass exodus of nurses who had been involved in the effort but were not able to be recruited and PTSD levels from Katrina were likely higher than what is recorded in this study. -Potential participants who were not computer literate were excluded on the premise that the study made use of an electronic questionnaire -Postage fees were incurred by participants, however this was attempted to be ameliorated with a 10 Dollar gift card a large compensation could have incentivised more participants. -Even though this is not an experimental design, this

								retrospective, cross-sectional, correlation survey study assumes that within this study sample, any PTSD symptoms are a result of Hurricane Katrina. A time lapse of 30-36 months between the stimulating event and the measured outcome introduces several threats to validity.
2	Chongruksa, Parinyapol, Sawatsri and Pansomboon, 2012	-Efficacy of eclectic group counseling in addressing stress among Thai police officers in terrorist situations -Counselling Psychology Quarterly	-Qualitative longitudinal study.	-To develop an eclectic group counselling intervention for Thai police officers to reduce the risk of developing symptoms of poor mental health while deploying in terrorist situations.	-423 police officers derived by clustered random sampling from seven districts of Yala province, Thailand.	-Data collection by self-report measures by completion of Beck Depression Inventory Second Edition, the General Health Questionnaire Thai version, and the Symptom Checklist 90. -Group counselling for both control and	-The trauma narrative revolved around external and internal factors (the potential or real possibility of personal harm or death due to exposure to violence, as well as hostility towards their "unfair" commanders, and their low salary.) -Positive or protective factors revolved around indicators of self actualization such as finishing graduate studies of	**Recommendations:** -Longer follow up window in future longitudinal study (this study was only at 1 month post intervention.) -A way to reduce attrition possibly through condensing sessions. -Honest reporting by police officers of unfair treatment by their commanders amidst situations of unrest may call attention to an area of potential intervention for future study (Fairness amongst commanders). **Limitations:**

						experimental groups (different). -Data analysis by two-way MANOVA: repeated measures; ANOVA: repeated measures and Bonferroni procedure.	starting personal business endeavours. - At 1-month follow up, the impact of intervention had dropped (work culture and circumstances). Unresolved stress from unfair treatment by commanding officers, lack of support from higher commanders, low salary and dissatisfaction with welfare, and personal problems which had not been solved.	-Though the control and experimental groups were randomized, aspects of age, religious faith and order of rank were not considered. -Follow up was limited 1 month post intervention which is a short period of time. -Many traumatised police were transferred to safer provinces and thus the sample studied may represent a more "resilient" or "tolerant" group of police (generalisability is impacted). -Violence related stressors may confound the impact of the intervention because the police were in a violent province while the intervention took place over 9 sessions.
3	Ângelo & Chambel, 2013	- The Reciprocal Relationship Between Work Characteristics and Employee Burnout and Engagement: A	retrospective longitudinal qualitative study	To test the bidirectional relationship between rescue work and burnout in firefighters.	-651 professional rescue mission Firefighters throughout Portugal.	-Self-report questionnaires with 2 wave full panel design, with a 1-year follow up.	-Causal direction of the relationship between organizational demands and burnout is reciprocal.	**Recommendations:** -Changes in organizational demands predict future burnout, which triggers a higher perception of job demands, it is crucial to develop organizational change programmes. These

		Longitudinal Study of Firefighters -Stress & Health			Convenience sampling.	-Cross-lagged panel analyses.	-Well-being is determined by both environmental and individual factors, in the specific professional context of firefighters. -Endorse the adoption of a comprehensive perspective to resources, demands, engagement and the relationships between firefighters and their supervisors in order to decreasing negative effects and enhance positive ones.	results should stimulate future longitudinal research of systematic interventions which promotes supervisory social support and engagement. **Limitations**: -Self reporting questionnaires increase possibility of variable relation to be due to common method variance. However-Harman's single-factor test (Podsakoff, MacKenzie, Lee & Podsakoff, 2003) mitigate this. -Absence of three wave panel study prevents rigorous interpretation of causality and reciprocity. -Framework used does not consider the moderator effects of resources, demand and engagement.

4	Pietrzak *et al.*, 2013	- Trajectories of PTSD risk and resilience in World Trade Center responders: an 8-year prospective cohort study -Psychological Medicine	An 8-year prospective Cohort study.	To evaluate the nature and determinants of predominant trajectories of PTSD symptoms in World Trade Center (WTC) responders	4035 WTC police responders. Convenience sampling.	-Data gathered through PTSD Checklist Specific-Stressor Version (PCL-S; Weathers *et al.* 1993). -Analysis through latent growth mixture modelling (LGMM; Nagin & Tremblay, 2001; Curran & Hussong, 2003; Muthén, 2004)	-Police responders were less likely to have clinically elevated patterns of WTC-related PTSD symptoms relative to non-traditional responders which is likely related to their having a higher level of training and preparedness in responding to trauma. -Factors independently related to symptomatic WTC-related PTSD trajectories in all responders included female sex, Hispanic race/ethnicity, lower education, prior psychiatric history, greater life	**Recommendations:** -Additional research is needed to investigate biological characteristics in the peritraumatic stage also to evaluate the effectiveness of targeting potentially modifiable risk and protective factors in preventing or modifying symptomatic trajectories of PTSD in this population. **Limitations:** -Sample comprised of volunteer WTC respondents who completed 3 visits to WTC-HP not generalizable to those who had not yet done so. -Retrospective Recall bias possibility especially in reporting of remote exposures, given most participants completed their first visit to the WTC-HP 3 years after 9/11.

							stressors prior to 9/11, increased severity of WTC exposure, and greater number of WTC-related medical conditions. -Social support has a buffering effect on risk for PTSD.	-The current study focused solely on the nature and determinants of PTSD symptom trajectories. -Self-reported psychiatric history may be unreliable, as a considerable proportion of persons with a psychiatric disorder never present for treatment and never be diagnosed. -Detailed mental health treatment history of participants was not available
5	Schwarzer, Bowler and Cone, 2013	-Social integration buffers stress in New York police after the 9/11 terrorist attack -Anxiety, Stress and Coping	Re-analysis of the WTCHR longitudinal database with a moderated mediation design.	-To examine the stress-buffering effect of social integration as a coping resource in moderating the detrimental effect of stress on mental health outcomes.	Convenience sampling on a sub-sample of 2943 police officers who had worked at least one shift from 11 September 2001 to 30 June 2002, at the WTC or related sites	-Data collection through internet, telephone or in-person enrolment interview. -All analyses were performed with the statistical	-The higher the exposure level, the more stress responses (main effect), but at a high level of social integration, this effect is buffered (interaction effect). The experience of witnessing horrible events in combination with a lack of social integration yields	**Considerations:** -It would be desirable to obtain objective data, in particular to have a valid event exposure measure that is not retrospectively assessed as in the present data. -Further research should explore the potential for workplace interventions that

					and completed both Wave 1 and Wave 2 questionnaires (Bowler *et al.*, 2010).	package for the social sciences (SPSS 20).	the highest level of stress.	might strengthen the social resources of affected victims. **Limitations:** -A limitation of the present data lies in their self-report nature and in the lack of additional measurement points in time (if social integration was present at wave 2 was this always present as a stable factor at other earlier points in time). -Moreover, self- reports of stress levels by police officers may be biased. The police likely represent a unique culture compared to area residents in their reluctance to reveal and self-disclose due to fears of job consequences.
6	Komarovskaya *et al.*, 2014	-Social integration buffers stress in New York police after the	Cross-sectional study.	To examine the relationship between early physical	-Convenience sampling.	-Data collected through completion of the Trauma	-Findings underline potential risk factor associated with adverse mental health outcomes for	**Recommendations:** -A longitudinal study should be conducted on a more diverse cohort to increase generalisability of findings

		9/11 terrorist attack -Psychological Trauma: Theory, Research, Practice and Policy.		victimization and long-term mental health outcomes in a sample of first responder police and firefighter personnel involved in the relief efforts after Hurricane Katrina	-Participants included 441 Biloxi and Gulfport Police (n= 174) and Firefighters (n=254) unconfirmed role (n=13). One fifth of participants reported having experienced physical victimization before age 18.	History Questionnaire (THQ; Green, 1996). -Data analysis through multiple regression analysis.	first responders to disaster -Early physical victimization in police officers and firefighters is associated with worse mental health outcomes after serving as a first-responder in major natural disaster. -Findings highlight the importance of considering early victimization as well as adult traumatic exposure when considering prevention and intervention for first-responders involved in disaster recovery. -Prevention programs designed to increase	and to clarify relationships between early victimisation and later adjustments to traumatic life events. **Limitations**: -Cross sectional study and causal or temporal associations may not be drawn (Longitudinal study needed). -Sample predominantly male future study could benefit from a more diverse cohort for greater generalisability of results. -We were not able to compare the mental health status of the participants pre- and post-disaster because the information about their adjustment before the hurricane was not available.

							emotional resiliency, and intervention models designed to treat PTSD may be potentially useful building blocks to an integrated approach to mitigate the effects of serving as first responders.	
7	Wenji, Turale, Stone and Petrini, 2015	-Chinese nurses' relief experiences following two earthquakes: Implications for disaster education and policy development -Nurse Education in Practice	This qualitative study utilized narrative inquiry and in-depth interviews	To describe experiences of Chinese nurses who worked in disaster relief after Wenchuan and Yushu earthquakes, and their views about future disaster nursing education training programs.	In-depth interviews were held with 12 registered nurses from Hubei Province. Purposive sampling.	-Data collection through focused interviews. -Riessman's narrative inquiry method was used to develop individual stories and themes, and socio-cultural theory informed this study.	-Participants placed importance on the development of teamwork abilities, critical thinking skills, management abilities of nurses in disasters, resilience, problem solving, critical thinking, organizational ability, adaptability, and strong professional knowledge and skills. -Participants recommended screening of	**Considerations:** -China's history of high loss of life and injury from large scale earthquakes and other disasters highlights the urgent need for disaster nursing education and training across the country. **Limitations:** -Although this study produced rich data, findings are limited as participants came only from hospitals in Wuhan. Nurses from other regions of China who worked in the disaster zones may have other instructive and perhaps different

							assigned nurses for physical fitness, as well as nurses with at least 3 years of experience from date of qualification. -Accurate debriefing prior to deployment is helpful for instance on factors which will need acclimatization in this case altitude sickness or paucity of resources. - The role of good management in disaster relief is indispensable and organizational and management skills related to materials and human resources are an important consideration	experiences, and could be involved in future studies.

							in the development of disaster nursing education.	
8	Schenk *et al.*, 2016	- Risk factors for long-term post-traumatic stress disorder among medical rescue workers appointed to the 2008 Wenchuan earthquake response in China -Disasters	Qualitative cross-sectional study.	To determine the risk factors for clinically-significant post-traumatic stress disorder (PTSD) among Chinese medical rescue workers one year after the response to the Wenchuan earthquake on 12 May 2008	- Convenience sampling of 337 medical workers who performed response work.	-Data collection through web-based questionnaire. -Analysed using PASW Statistics 18 and Epi Info version 3.5.3.2	-Injury on duty, experiencing a water shortage, being disconnected from family and friends during the response, and having passive coping styles and neurotic personalities were high risk for PTSD. -Perceived lack of food and water might be proxies for perception of lack of support, resulting in increased stress. -Workers who had frequent supportive talks with their teammates and regular	**Recommendations**: -It would be beneficial to have a standardised study design to assess the mental health of rescue workers. -Strategies for mitigating the development of long-term PTSD may also include, therefore, providing communication networks to family and friends during a disaster response to help sustain a support system. **Limitation:** -Poor response rate around 50% introducing the possibility of selection bias. Too small to generate the statistical power required to discern relations.

							communication with family and friends were less likely to experience PTSD symptoms. -Factors that cannot be changed easily, such as personality traits, should be evaluated prior to deployment to ensure that rescue workers at higher risk of PTSD are provided with adequate support before and during deployment.	-The mental health assessment tools, specific to the Wenchuan earthquake, limits its ability to compare them to those of other analyses that employed different methods. -This study is only a snapshot in time, limiting the ability to discern causality of PTSD risk factors.
9	Feder *et al.*, 2016.	-Risk, coping and PTSD symptom trajectories in World Trade Center responders -Journal of Psychiatric Research.	Qualitative Longitudinal study.	Characterize predominant trajectories of WTC-related PTSD symptoms over a 12-year period in responders 2. Evaluate the relation	-Convenience sampling. -1874 police who voluntarily presented to the WTC-Health program for	-Data collected through self-reported web or pencil-based survey. -Multinomial logistics regression analysis.	-The observation of symptoms of chronic PTSD 12 years after WTC exposure, observation of worsening symptoms over time. -Maintenance of lower symptoms in Police vs voluntary responders.	**Recommendations:** - Taken together, these findings can inform recommendations for future disaster preparedness and planning. - Future efforts should be devoted to designing interventions targeting potentially modifiable factors

				between risk factors, including lifetime trauma exposure and medical illness in PTSD symptoms. 3.Incorporate a range of potentially modifiable protective characteristics, and other factors associated with resilience to and recovery from PTSD in the literature.	monitoring visits.		-Cumulative effect of other life stressors besides WTC, are independently related to PTSD and social integration, focused coping, sense of life purpose and less substance use coping were negatively related to the occurrence of PTSD symptoms. -Demographic factors such as Hispanic heritage were related to higher incidence in PTST symptomology. -Medical conditions diagnosed on or after WTC were interlinked with higher PTSD symptomology.	in WTC and other disaster responder populations, including enhancing adaptive coping strategies, social support and a sense of purpose in life. **Limitations** -Study subjects comprised of participants who voluntarily presented to the WTC-Health program for monitoring visits (convenience), with only 61% of participants consenting to being contacted for additional research study which limited generalizability of results. -Some widely used and validated tools were used (PCLS), notwithstanding a lot of data was from self-report questionnaires. -DSM4 was used in early assessments thus further study into how that translated to DSM5 criteria which was used for later visits needs to

								be done to assess transcendence of results. -Retrospective recall bias may have affected the reported severity of past traumatic life events in subjects who were symptomatic. -Sixth, a range of work-related and psychosocial factors (e.g., disaster preparedness, coping strategies) were assessed at Time 4, precluding any assessment of directionality of associations.
10	Garner, Baker and Hagelgans, 2016	-The Private Traumas of First Responders -The Journal of Individual Psychology	Qualitative Case Study.	To reveal the connection between first responders and mental health issues	-Purposive sampling. -1 Urban professional firefighter with extensive experience,	-Data collected through focused interview by a counsellor. -The author conceptualises the case study through an	-Rescue workers comprise a strata of society more resilient to mental health illness. -First responders are susceptible to trauma, despite social perceptions.	**Recommendations:** -Counselling or intervention efforts should be aware of private traumas of rescue worker. -Emergency management and related first responder

					USA (Case study).	Adlerian lense/framework. -Descriptive Analysis.	-Reversibility of trauma (heart and brain) with well guided interventions on BCT. -Individual factors play an impact in vulnerability to PTSD development but individual factors happening in and around the exposure event are the most determinant. -Cognitive processing of events and trauma are important to mature into a non-dissociated reality.	training programs, would do well to integrate the studies of mindfulness, how the brain responds to stress and trauma, and the therapeutic benefits of developing social support, into their curriculum. **Limitations:** -The findings of the study are prescriptive and require future study to ascertain relationships between recommended intervention and clinical outcomes.
11	-Haleem Masood, Aziz and Jami, 2017	-Psychological Capital and Mental Health of Rescue Workers	A qualitative Cross-Sectional survey	To explore the predictive role of Psychologica	502 Male rescue workers using purposive	Data collection self-report questionnaire. Urdu versions of Mental Health	-There is scarcity of research/evidence in the predictive role of PC on psychological	**Recommendations**: Findings provide organizations with knowledge to develop

		-Pakistan Journal of Psychological Research	research design.	l Capital (PC) in psychologica l well-being and distress.	convenience sampling	Inventory (Khan, Hanif, & Tariq, 2015) and Psychological Capital Questionnaire (Self- Rater Short Form; Abbasi, 2015) were administered on the sample. -Regression analysis showed the predictive role of PsyCap dimensions including hope, efficacy, optimism, and psychological well-being.	wellbeing and distress. - Participants who scored higher on PsyCap were expected to have enhanced psychological well-being. - Efficacy, resilience, hope, and optimism significantly positively predicted psychological well-being. -Factors that have contributed to positive resources and well-being of rescue workers are norms and values of collectivistic culture, sense of community, sense of compassion, coping, religious belief and	Psycho-educational programs and workshops in relation to positive PC resources encompassing efficacy, hope, resilience, and optimism to cope effectively with stressful incidents. **Limitations:** -Sample included rescue workers from only Rescue 1122, Future research can be done on diverse populations regarding helping professions to increase the generalizability of findings. -Disproportion of the sample regarding gender as only male rescue workers participated. So gender based comparisons cannot be drawn. -Social desirability, which can cause inflated responses in terms of positive responses

							relatedness towards others	
12	Smith *et al.*, 2018	-Sleep Disturbance Among Firefighters: Understanding Associations with Alcohol Use and Distress Tolerance -Cognitive Therapy and Research.	- Cross-sectional design, Secondary analysis of data from a larger project examining stress and health-related behaviours among firefighters.	-To examine the main and interactive effects of alcohol use and distress tolerance on sleep Disturbance among fire-fighters.	- Convenience sampling on 652 professional firefighters (611 male.) 18 years and older.	-Data collection through a number of self-report questionnaires. -Descriptive statistics, bivariate correlations, and study hypotheses were tested using IBM SPSS 24.0	-Higher alcohol misuse and lower distress tolerance were each significantly associated with greater sleep disturbance. - Distress tolerance was incrementally associated with global sleep disturbance among firefighters. Firefighters with low distress tolerance may be apt to manifest lower subjective sleep quality and higher daytime fatigue (possibly due to emotional hyperarousal), but	**Recommendation:** Future work may incorporate more objective measures of sleep efficiency beyond self-report. -Longitudinal investigations examining the role of distress tolerance in terms of predicting risk and resilience among firefighters are imperative, as such empirical efforts have potential to inform specialized distress tolerance interventions for firefighters. **-Limitation** Cross-sectional design and thus, no inferences regarding causality among variables can be inferred.

							not lower sleep productivity. -Occupational stress was most robustly related to global sleep disturbance, as compared to either alcohol use severity or distress tolerance, underscoring its clinical relevance with regard to sleep among firefighters	-Self-report methodology facilitated the screening of a large sample of firefighters, effects of method variance and reporting bias cannot be ruled out. -This study did not control for affective symptoms or psychiatric disorders. - alcohol and sleep variables within the current study were assessed according to different timeframes (past year and past month, respectively).
13	Jordan *et al.*, 2019	-Persistent mental and physical health impact of exposure to the September 11, 2001 World Trade Center terrorist attacks	Qualitative cross-sectional descriptive study.	To describe the prevalence and patterns of GERD, PTSD, depression on associated health-related	-Convenience sampling. -16 424 registered rescue/recover worker participants in the WTC	-Study data gathered through a periodic survey. -Analyses were conducted in SAS version	-Study found that the effects of ground zero rescue work are multiple and not only limited to physical or psychological but in instances can include both.	**Recommendation:** -Despite free care for 9/11 exposed rescuers, 26% of those affected by reported unmet mental health care needs in the last year alluding to barriers to this groups' help seeking behaviours (further investigation or study).

		Environmental Health		quality of life (HRQOL) fifteen years after the 9/11 attacks.	Health Registry above the age of 18 years completed baseline (2003–2004) and follow-up (2015–16) questionnaires	9.4 (SAS Institute, Inc., Cary, North Carolina). For all analyses, 2-sided P values were considered significant when less than 0.05.	-Co-morbidity is a reality and one which leads to lower reported health-related quality of life (HRQOL) -Those struggling with mental health issues, such as PTSD or depression reported the lowest HRQOL, suggesting that more efforts need to be made to reach this group of vulnerable population	- Outreach to inform exposed persons of available health resources, focusing on sub-groups with a particularly high prevalence of mental health conditions, is essential. **Limitations:** -All data was self-reported -Self identified PTSD of depression sufferers were more likely to participate in wave 4 than those who were contacted regarding the same symptoms from the registry, this may have led to an over estimation of the mental health effect on 9/11 exposure on rescue workers.
14	Joyce *et al.*, 2019	-Can Resilience be Measured and Used to Predict Mental Health Symptomology Among First	-Multivariate linear regression, a secondary analysis of the data collected	To examine whether baseline measures of resilience among active first responders	-Convenience sampling. -143 (active not trainee) Firefighters	-Data gathered through Voluntary baseline survey.	-Self-reported low resilience at baseline, using two separate measures, predict increased risk of PTSD and depression symptoms at 6-	**Recommendations:** -Outcomes provide preliminary support of resilience as a resource for possible screening and intervention with the

		Responders Exposed to Repeated Trauma? -Journal of Environmental Medicine (JOEM)	during the parent research project (randomized controlled Trial)	predicts future mental health symptomology following trauma exposure.	recruited from 24 Primary rescue and hazmat stations in New South Wales, Australia but not currently attending sessions with a psychologist /psychiatrist.	-Linear regression analysis.	month follow-up, but not increases in alcohol use (Resilience measures may be a helpful modifiable risk factor for this group.) -Focusing on factors which enhance adaptive resilience among first responders may improve their ability to manage the potentially traumatic events that remain an unpredictable yet inherent in their work.	potential to reduce the risk of PTSD and depression. -Replicate using RCT on a more divers sample to establish whether screening and focused interventions can produce measurable benefits over and above any risks. **Limitations:** -Small sample size, use of self-reported measures of resilience and mental health symptomology albeit the use of scales which are well validated. -Despite the prospective nature of the present study, still potential for reverse causation; that is, symptom levels at baseline may have influenced reported resilience levels. -Sample mostly men, sourced from one emergency service agency, potentially impacting

								on the generalisability of our findings. -measure of ongoing exposure to trauma relatively crude and did not allow examination of potential differences in resilience to different types of situations.
15	Kim *et al.*, 2019	-Effect of Burnout on Post-traumatic Stress Disorder Symptoms Among Firefighters in Korea: Data From the Firefighter Research on Enhancement of Safety & Health (FRESH) -Journal of Preventive Medicine and Public Health.	-Cross sectional analysis	To explore the association between burnout and its related factors, such as trauma and violence, and PTSD symptoms among firefighters in Korea.	-Convenience Sampling. -535 firefighters participated in the Firefighter Research on Enhancement of Safety & Health study at 3 university hospitals from 2016 to 2017	-Data collected through a web-based survey. -Confirmatory factor analysis.	-Firefighters were at high-risk of experiencing burnout and ERI (effort reward imbalance). - Firefighters are more vulnerable to PTSD from secondary trauma rather than primary trauma which is as a result of direct exposure to trauma. -Increased burnout caused by work-related stress was increasingly associated with	**Recommendation**: -longitudinal data analysis should be conducted to determine the causality between job-related stress, burnout, and PTSD. -Future studies should analyse other occupations with similar stress profile. **Limitations:** -Small sample size. -Cross section study cannot infer causality.

							PTSD, this can lead to exhaustion and depersonalization. -Reducing occupational exhaustion may reduce the risk for burnout and its trajectory. -Self efficacy is inversely related to work related stress and burnout.	-Because only firefighters included in study, cannot generalize to other rescue workers. -The "healthy worker effect." Firefighters with PTSD retire earlier than the average retirement age, so those who were relatively health-conscious were more involved in the study, the analysis may have produced a lower PTSD score than it actually should have yielded. -Conditions, such as quality of sleep and level of shift work, that may affect participants' physical and mental health and could function as confounding factors.
16	Lilly *et al.*, 2019	-Destress 9-1-1—an online mindfulness-based intervention in	Randomised controlled trial	To evaluate the efficacy of an online mindfulness	-Simple random sampling.	-Data collection through completion of The Calgary	-Findings support the benefits of a tailored online mindfulness based interventions	**Recommendations**: -Future effectiveness studies are needed to identify and

		reducing stress among emergency medical dispatchers: a randomised controlled trial -Occupational and Environmental Medicine		training in reducing stress in EMDs.	-Participants included 323 (262 Female) active-duty 9-1-1 tele-communicators (ie, EMDs) from across the USA and Canada, and most had been in employment as EMD's for at least 2 years (>70%).	Symptoms of Stress Inventory (C-SOSI) base line questionnaire at 3 pre-determined intervals. -An ad-hoc subgroup analysis was conducted using a two-sample t-test to compare change in C-SOSI scores from time T1 to T2 between these two groups.	(MBI's) targeting stress in EMDs. -Despite the non-significant findings in regard to mindfulness scores, greater positive change in mindfulness scores was associated with greater reductions in stress post training and at follow-up. Enhanced mindfulness scores were not observed following the training.	remove barriers to engagement. -Future directions may include a focus on the impacts of different intervention dosages and use of the training in preventive efforts. -Identification of the modules of the training that were more impactful may also assist in developing more intensive materials in content areas found to be most beneficial. As stress levels were measured only pre and post intervention, changes in stress in response to specific modules cannot be determined in this study and should be investigated in future research **Limitations:** -Although majority of group completed the 6-7 training

								modules, the average number of days per week where exercises were practiced was 2. -Owing to the rigor and unpredictable nature of EMD work, time was not consistently awarded, or available to participants in order to complete intervention exercises during work hours. -Finally, participants were not asked to specify the exercises they completed as part of their daily practice. As such, it cannot be determined whether specific exercises (ie, mindful eating and mindful movement) or practices (ie, guided meditation) were completed more frequently or were most impactful.

Quantitative Study

	Author (s), Year & Setting	Journal	Aim of Study	Research Methodology Design	Population & Sample	Data Collection & Data analysis	Findings	Recommendations/ Limitations
1	Sünram-Lea *et al.* 2011	Psychopharmacology	The aim of the present study was to investigate the effects of anticipation and exposure to stress on strength, cognition, mood and cortisol release and to assess the effects of two energy drinks on behavioural and biochemical measures in physically demanding, stressful situations.	Using a double-blind, mixed method design, Quantitative.	81 participants recruited via opportunity sampling from firefighter attendees at the 3-day basic fire-training course at Fleetwood Nautical College, UK.	-Data gathered through completion of the Blood service screening questionnaire. Further data through blood and saliva testing. -A two-way analysis of variance (ANOVA), used to analyse the variance between factor being drink and time.	-Cortisol levels significantly higher after the search and rescue exercise; however, no effect of drink administration on cortisol levels contrary to previous findings. -Current data suggest that glucose supplementation might aid retrieval of previously learned material /information in stressful situations -High glucose /low caffeine drink resulted in greater increase in grip strength after fire-fighting exercise and also led to greater increase in strength compared to placebo but to a lesser extent.	**-Consideration** Future studies to evaluate the dose-dependent enhancement effects on cognitive performance and mood and the contribution of individual substance (glucose and caffeine) to the observed effects. **Limitation:** -Clear interpretation of the results in terms of the effects evinced by caffeine or glucose is not possible because of the use of drink mixtures. Cannot determine whether the observed effects are due to one substance or the other and whether there are interaction effects.

Mixed Method Studies

	Author (s), Year & Setting	Journal	Aim of Study	Research Methodology Design	Population & Sample	Data Collection & Data analysis	Findings	Recommendations/ Limitations
1	Surgenor, Snell and Dorahy, 2015	New Zealand Journal of Psychology	To survey coping resources and psychological health outcomes in police working during the 2010- 2011 earthquakes in Christchurch, New Zealand	Mixed method	768 Police Staff residing in Canterbury on 22 Feb. 72,7% males n = 558, Female=210. Purposive sampling	-Study data gathered through an internet-based survey was circulated using Survey Monkey® (www.surveymonkey.com). Directed qualitative content analysis of free text responses that followed the main questionnaire	-Gains were evident, such as enhanced self-efficacy and pride in contributing as police during the critical periods.	**Considerations:** -Future research on risk for development of resource loss spirals leading to chronic stress outcomes, using longitudinal designs with follow-up extending beyond the early weeks after a disaster. **Limitations:** -Sample from a given area in New Zealand, findings may not be generalisable beyond this population group. - Open ended question at the end of the survey followed structured questionnaires asking about coping resources and styles, distress, and general health outcomes. May have primed respondents to focus on these aspects. -Some researchers also experienced the

								earthquakes and worked as clinicians treating distressed members of the affected area and may have introduced bias. The inclusion of an additional co-author (JHS) who did not live in the affected community and did not experience the earthquakes was considered important to verify the data analysis.
2	Swab, 2020	Dissertation ProQuest	To identify positive and negative influences that could predicate better stress management leading to healthier lifestyles. To identify utilization of education and resource options for helping first responders to manage and cope with	This mixed methods research design employed both quantitative and qualitative research through the use of multiple choice and open-ended questions within an online survey.	This survey research studied stress management of emergency responders professionals among 153 respondents in Western PA above the age of 18. 74% (114) were male 25,4% (29) were female. Convenience sampling.	-Multiple choice and open-ended questions within an online survey. Data were collected and analysed using statistical procedures within SPSS. The rich descriptive data of qualitative research were collected through the use of open-ended question responses and was analysed using narrative coding.	-Sleep deprivation was determined to have a negative impact on the ability to cope with stress. -Stress from working in the EMS profession was identified as the most significant and prevailed over other life issues such as finances, relationships, higher education, and caregiver responsibilities.	**Consideration:** -Future research should expand the scope of participants: larger, more diverse populous in order to acquire a better understanding of stress management of emergency professionals. Stress management training in this study appraised as being poor hence the efficacy and applicability of this training to emergency response teams should be investigated and studied **Limitation:**

			stress as a result of the profession and in combination with the stressors that were incurred outside of the profession.				-Methods which were found to be helpful in aiding EMS workers manage their stress were: a supportive administration, *effective* stress management education as part of initial emergency responder certification classes, and stress management education on a regular basis such as through continuing education.	- Research on a small demographic area in Western Pennsylvania, generalizability of results may benefit from a more diverse cohort. -Participants in the survey sample selected from a pooled list of emergency medical services exclusively. Only those participants working in emergency response or another public servant profession might provide a glimpse into the specificity seen in the police, firefighter, or 9-1-1 dispatcher sectors. -Survey research based on self-reported data, limitations existed on honesty, privacy, and the desire to respond to questions under perceived social norms. Respondents interpret stimuli differently.

3.2.2 Quality Appraisal Stage

Critical appraisal of quality has been described as a systematic examination of literature to evaluate its reliability, value, relevance in a particular context, and avoidance of potential sources of bias (Toronto and Remington, 2010; Conn *et al.,* 2003). Quality in research is fundamental to the goals of science, producing reliable knowledge (Conn *et al.,* 2003). It is tantamount that all evidence be assessed for quality in an organised way before it is included in the integrative review. The researcher's clinical experience enhances their ability to check the validity of study methods and results and aids in determining the usefulness of the research for practice (Beyea and Nicoll, 1998; Souza *et al.*, 2010). For this reason, the study supervisor, a duly trained assessor for the Joanna Brigs Institute, supplemented the researcher's efforts by providing clinical guidance and expertise in this review stage.

Evaluating the quality of primary sources in an integrative review can be complex, especially when different types of primary studies are included (Whittemore and Knafl, 2005). There is currently no gold standard for interpreting quality in an integrative review; however, researchers agree that quality should be evaluated differently depending on the sampling frame. The quality of studies has been described as the extent to which the study uses measures to minimize bias in the research design, conduct, and analysis (Toronto and Remington, 2010; 46). Whittemore and Knafl (2005) recommend the strict use of inclusion and exclusion criteria to screen for the quality of data to be incorporated in the review. Because Critical appraisal is about judgment-making, it is advisable to have at least two assessors independently involved in the evaluation process in order to decrease bias (Pluye *et al.,* 2011; Whittemore and Knafl, 2005; Toronto and Remington, 2010; Knafl and Whittemore, 2017). A third assessor may adjudicate in instances where the findings of the independent reviewers differ.

For this reason, the study supervisor and a duly qualified additional assessor, appointed by the study supervisor supplemented the researcher's efforts by independently appraising the primary sources using valid appraisal tools. The data selected for this review was drawn from literature with either quantitative, qualitative or mixed methodology study designs. Since quality appraisal tools are study design-specific, Toronto and Remington (2010) recommend using a methodology-specific tool to review different study designs. Each

included study was evaluated using a critical appraisal tool appropriate to its methodology. This process is discussed in more precise detail in section 3.2.2.1.

If clinical or practice-related decisions are to be made on research evidence, then any potential effects of bias must be minimised within the individual studies and in the process of bringing their results together in a review (Webb and Roe, 2007; 3). Bias can mean any element or factor that affects the results of a study in a way that makes it different from the truth. One threat to validity in the data evaluation phase is the propensity for positively evaluating research that is congruent with the researcher's own beliefs and negatively evaluating those studies that are not. In a properly executed integrative review, the effects of subjectivity can be minimized through carefully applied criteria for evaluation. Internal validity is determined by the focus on bias or believability of results and how closely they approximate the truth, while external validity is a measure of the generalizability of results to the population of interest (Toronto and Remington, 2020). The use of the scientific method bolsters validity.

3.2.2.1 Expository evaluation of qualitative studies.

This study used the Critical Appraisal Skills Program tool (CASP, 2018) to appraise qualitative studies included in this review. The CASP tool is comprised of a 10-question checklist which guides the reviewer in gaining a better understanding of the study under examination. When appraising a qualitative study, one must determine the research results, their validity, and their usability and applicability to the population of interest (CASP, 2018). The CASP tool proved very useful to the researcher in working systematically through essential quality criteria in each of the included studies and as a screening tool without which pertinent date may have been missed or excluded in this review. The format of the quality appraisal tool resembles that of a checklist for which each screening question requires a "yes", "no", or "cannot tell" answer, which must be selected before moving ahead with the following question on the checklist. Questions covered issues related to clarity in study aim, appropriateness of study methodology and design, the efficacy of data collection methods, ethical considerations and scientific rigor, and the value of research findings (CASP, 2018). Italic notes on the right side of the questionnaire help to contextualise the relevance of each quality appraisal question. It is helpful for the reviewer to have a precisely defined research purpose and variables on hand, which assisted in determining the relevance of the data. Each

included study was appraised by two independent evaluators using the standard approved CASP checklist, which can be found in **Appendix A.**

3.2.2.2 Expository evaluation of quantitative studies

This study used the McGill 2018 version of the Mixed Method Appraisal Tool (MMAT), developed by Pluye *et al.* (2018), because of its usability for the appraisal of the quantitative literature. The MMAT allows the appraisal of the most common study methodologies, specifically empirical studies which include randomized control trials (RCT's), non-randomized studies, and descriptive studies (Pluye *et al.*, 2011). The tool comprises an initial check list, followed by indicators of methodological quality criteria in part two. Evaluators must reply "yes", "no," and "cannot tell" as appropriate while using the screening checklist component in part one of the tools. Part two indicators of methodological quality included target population representativeness, identification of confounding factors, intervention methods, sampling strategy, rigor and bias, and randomisation issues (Pluye *et al.*, 2011). Because the list of indicators in part two is not exhaustive, it was necessary to consult with the study supervisor on which indicators were necessary for the study, and these were applied uniformly across all included studies with the same characteristics. Based on the premise that critical appraisal is derived from judgement-making, and in keeping with the author's recommendations, two independent evaluators were employed (Pluye *et al.*, 2011). The study supervisor, one of the independent evaluators, was also experienced using this appraisal tool and was consulted for guidance throughout the appraisal process. A summary of the individual quality rating score is presented in **Table 3.3.**

3.2.2.3 Expository evaluation of mixed method studies

The McGill 2018 version of the Mixed Method Appraisal Tool (MMAT), developed by Pluye *et al.* (2018), was used to appraise included mixed method studies. Because the tool is flexible, it is indicated for the appraisal of qualitative, quantitative and mixed-method studies. Special attention was given to the five (5) methodological quality indicators specific for the mixed method appraisal, and this was different from the criteria provided in the tool to appraise qualitative or quantitative studies (Pluye *et al.*, 2011). (The detailed MMAT tool can be found in **Appendix C**).

Although the authors of the MMAT discourage the calculation of overall score from the rating of each criterion and instead opt for a detailed presentation of the ratings of each criterion in part two of the tool to better inform the quality of the included studies (Pluye *et al.*, 2011), this way studies are subjected to sensitivity analysis by which contrasting results are compared to one another. The MMAT authors do not indicate a cut-off point for rating the studies as low or high quality, and the study supervisor recommended a mid-score (50%) as a cut-off point to grade the studies. The 2011 MMAT version (Pluye *et al.*, 2011) scoring metric was adopted for quality scoring. A summary of the individual quality rating score is presented in **Table 3.4.**

Table 3.2: "Critical Appraisal Skills Programme" (CASP, 2018), tabulation of quality appraisal data from Qualitative studies.

Author	Study aim is clear	Methodology is appropriate	Study aim is addressed by design	Appropriate recruitment strategy	Data collection addresses research issue	Reflexivity relationship between researcher and participants	Consideration of ethical issues	Sufficient rigor of data analysis.	Clear statement of findings	Value of research	Score
Ângelo & Chambel	√	√	√	√	√	√	√	√	√	√	10/10
Chongruksa et, al.	√	√	√	√	√	√	√	√	√	√	10/10
Feder *et al.*	√	√	√	X	√	√	√	√	√	√	9/10
Garner *et al.*	√	√	√	√	√	√	√	√	√	√	10/10
Haleem *et al.*	√	√	√	X	√	√	√	√	√	√	9/10
Jordan *et al.*	√	√	√	X	√	√	√	√	√	*	8/10
Joyce *et al.*	√	√	√	X	√	√	√	√	√	√	9/10
Kim *et al.*	√	√	√	√	√	√	√	√	√	√	10/10
Komarovskaya *et al.*	√	√	√	√	X	√	√	√	√	√	9/10
Lilly *et al.*	√	√	√	√	√	√	√	√	√	√	10/10
Pietrzak *et al.*	√	√	√	√	√	√	√	√	√	√	10/10
Schenk *et al.*	√	√	X	X	X	√	√	√	√	√	7/10
Schwarzer *et al.*	√	X	X	X	√	√	√	√	√	√	7/10
Smith *et al.*	√	√	X	√	√	√	√	√	√	√	9/10
Wenji *et al.*	√	√	√	X	√	√	√	√	√	√	9/10
Urrabazo.	√	√	√	X	√	√	√	√	√	√	9/10

CASP (Critical appraisal skill program) - Key to ratings: √ = Yes, detailed coverage of the screening question; X = No, screening question not addressed; * = Can't tell, screening question indicated but not clear in the write-up

Table 3.3: Quality assessment of Quantitative studies using MMAT-version 2011 (Pluye *et al.*, 2011)

Study		Relevant sampling strategy to address the research question	Is the sample representative of the population understudy?	Are measurements appropriate?	Is there an acceptable response rate (60% and above)?	Quality (%)	Comment (s)
Sünram-Lea *et al.*, 2012		X	√	√	√	75%	Purposive convenience sampling.

Key to ratings: √ = Yes, detailed coverage of the screening question; X = No, screening question not addressed; * = Can't tell, screening question indicated but not clear in the write-up"

Table 3.4: "Quality assessment of mixed method using MMAT-version 2011 (Pluye *et al.*, 2011)

MMAT critical appraisal component		Study	Comments	Study	Comments
		Snell *et al.*, 2014		Swab, 2019	
Qualitative Component	Are the sources of qualitative data relevant to address the research question (objective)?	√	Cross Sectional Descriptive study. (Coping and adjustment)	√	
	Is the process for analysing qualitative data relevant to address the research question (objective)?	√		√	
	Is appropriate consideration given to how findings relate to the context, in which the data were collected?	√		√	
	Is appropriate consideration given to how findings relate to researchers' influence, e.g., through their interactions with participants?	√		√	
Quantitative Component	Is the sampling strategy relevant to address the quantitative research question?	√		√	
	Is the sample representative of the population under study?	√		√	
	Are measurements appropriate (clear origin, or validity known, or standard instrument)?	√		√	
	Is there an acceptable response rate (60% or above)?	√	72% Participation rate	√	76.88% completion rate based on the number of questionnaires viewed, started and completed.

Mixed Method	Is the mixed methods research design relevant to address the qualitative and quantitative research questions (or objectives)?	X	Qualitative cross-sectional component may not have yielded data capable of addressing the longitudinal nature of the issue under study.	√	This research employed the use of Pearlin's Stress Model (1989) as the theoretical framework. Research conducted by Hawk and Martin (2011) indicated the use of a mixed methods approach to study stress reduction, providing a good example of similar research.
	Is the integration of qualitative and quantitative data (or results*) relevant to address the research question (objective)?	√		√	
	Is appropriate consideration given to the limitations associated with this integration?	√		√	

Overall rating 100%
Key to ratings: √ = Yes, detailed coverage of the screening question; X = No, screening question not addressed; * = Cannot tell, screening question indicated but not evident in the write-up."

3.3 DATA ANALYSIS STAGE

Data analysis is included in the fourth stage of the integrative review process (Russel, 2005; Whittemore and Knafl, 2005). The analysis is appraising each study with the objective of understanding significant results that address the research question and components within each study that may have contributed to the outcomes (Knafl and Whittemore, 2017). This stage concerns a diligent and impartial interpretation of primary sources and the amalgamation of evidence derived from new knowledge. Integrative reviews can provide a wholistic view of a topic by combining data form various sources with different methodologies. Data points from separate studies are combined and unified into a collective

inference about the research problem (Whittemore and Knafl 2005). The process of combining differing types of data can be challenging. Detailed and structured methods for data analysis are needed to protect against bias and improve the accuracy of interpretation. Data analysis enhances the rigor of the review and necessitates an ordered approach to weighing the characteristics of included studies (Souza *et al.*, 2010).

For this study, the data analysis stage was conceptualised as foundational to synthesising valid knowledge. The reviewer could amalgamate concepts across studies by adhering to meticulous data analysis methods to create new knowledge (Torraco, 2016). The data analysis steps, as prescribed in Whittemore and Knafl (2005), provided the framework for this research stage. The constant comparison approach to data analysis was compatible with the use of data extracted from varied and diverse methodologies. These steps included data reduction, display, comparison, conclusion drawing and verification (Whittemore and Knafl, 2005). These steps are described in more detail below.

3.3.1 Data Reduction

Determining a general classification system for the grouping and managing of data across diverse methodologies comprises the essence of data reduction (Souza *et al.*, 2010). Classification provides parameters for differentiating factors which will determine the inclusion or exclusion of data in a given subgroup. This approach enables a brief organisation of data, facilitating subsequent analysis. In this study, data from primary sources were extracted and reduced to one page using classification criteria deduced from a validated classification tool (Souza *et al.*, 2010) (refer to **Appendix E**). The reviewer strove to uphold scientific rigor during this stage through reliable coding procedures by clearly stating assumptions when discussing inferences and delineating single study-based evidence from review-based (Brown *et al.*, 2003).

3.3.2 Data Display

This process involved translating extracted data from primary studies into a visual representation of information and tabulating this data based on the information subgroup or characteristic (Whittemore and Knafl, 2005). Data was retrieved from the primary sources using the prepared and validated instrument provided by Souza *et al.* (2010), as displayed in

Appendix E. The types of information tabulated included the author, journal and year of publication, the aim of the study, research methodology, population sample, data analysis method, findings, and limitations or considerations (see Table 3.1). This tool was instrumental in simplifying and summarizing findings into one page. Visualising the data points in this way facilitated the discernment of themes and relationships across the included studies (Souza *et al.*, 2010; Whittemore and Knafl, 2005). Furthermore, this initial comparison comprised the first part of data interpretation.

3.3.3 Data Comparison

The data comparison phase necessitates the continual examination of data displays to identify patterns, themes and relationships between included studies and their findings (Whittemore and Knafl, 2005). After meticulously reviewing the numerous individual articles within the literature review, the reviewer acquires a comprehensive grasp of the calibre of the literature and is prepared to appraise it (Torraco, 2016) analytically. Clustering, contrasting and comparing findings from primary studies are analytic activities which increase scientific rigor and support synthesis during the final phase of the constant comparison method (Whittemore and Knafl, 2005). The rigorous and repetitive examination informed the conceptualising of groups and subgroups of information within this study of data displays, which led to the inductive codification of data by themes and subthemes. A conceptual map emerged from these codes, where information with similar characteristics and those with variable characteristics were grouped with similar themes (Whittemore and Knafl, 2005). From this data grouping, the chronological order of findings and results became apparent and depicted the progression of evidence across the time span of the included primary studies. In addition to identifying eventual gaps in knowledge, it became possible to discern priorities for future studies. The themes that emerged from this synthesis were presented for simple comparison (see figure 4.1).

3.3.4 Data Conclusion and Verification

Conclusion drawing and verification is the final phase of data analysis. During this phase, the reviewer moves from describing patterns and relationships to introducing and subsuming particulars into the general (Whittemore and Knafl, 2005). The reviewer meticulously revisited primary sources to verify the accuracy of new synthesized evidence and made

corrections where these were indicated. In order to faithfully portray the true findings from primary sources, the reviewer stressed inferences and explained any biases in drawing conclusions from the inductive process (Souza *et al.*, 2010). A new conceptualization of the primary sources coalesces all subgroups into a global portrayal of the topic of interest, thus completing the review process (Whittemore and Knafl, 2005; 551). A record was kept during the entire data analysis process, documenting decisions, hunches, thoughts and uncertainties. The reviewer undertook regular discussions with the supervisor during cross-examination of the data analysis process and verifying the themes' validity and accuracy (Refer to figure 4.1).

3.4 METHODOLOGICAL RIGOR

An integrative review's data reduction and data analysis stages are prone to error due to bias. This section discussed scientific rigors employed to minimise the effects of bias on the accuracy of results.

3.4.1 Data Evaluation

The data evaluation stage comprises the data extraction and appraisal processes, which will be discussed individually and respectively in the following section.

3.4.1.1 Data extraction

The data extraction tool developed by Souza *et al.* (2010) was used in this study for its suitability in the extraction of data across studies and sources of mixed methodology. This is a validated tool, which the developers condoned for use in this study. The reviewer's efforts were supplemented by the supervisor, who independently used the tool to extract relevant data from the included studies. The supervisor had previous experience in co-authoring integrative reviews and was a valuable aid in ensuring methodological rigor and enhancing the extracted data's validity. To further bolster the rigor employed in the review, a duly nominated evaluator independently cross-checked the validity of extracted data using the data extraction tool wherever necessary clarity was sought from the tool's developers.

3.4.1.2 Critical appraisal

The integrative review methodology commands thoughtful and detailed work to produce useful scientific knowledge for practice and research (Russel, 2005). Explicit and systematic methods for data analysis and careful consideration of threats to validity can mitigate bias and enhance the accuracy of outcomes (Whittemore and Knafl, 2005; Russel, 2005). Appraisal of literature based on the researcher's preconceived beliefs is a bias with the potential to reduce the validity of results (Russel, 2005). Using a critical appraisal tool may reduce the risk of bias and improve the validity of results.

The reviewer's experience impacts the accuracy with which an appraisal or evaluation tool can be used. Before commencing with the final critical appraisal of the data extracted from the included studies, the research supervisor supported the reviewer in using the critical appraisal tool through a supervised pilot study. This hands-on preparation was crucial in familiarising the reviewer with the appraisal tool and enhancing the reviewer's capability in the data appraisal phase. To further decrease the effects of bias and bolster the validity of results, it is recommended to employ the services of more than one independent reviewer in the appraisal process (Toronto and Remington, 2010). Wherever there was discord, a third independent evaluator adjudicated the final decision.

Toronto and Remington (2010) assert that several critical appraisal tools can be used for the data evaluation process. Using a validated critical appraisal tool can reduce the risk of bias, increase scientific rigor and improve the validity of results (Souza *et al.*, 2010; Toronto and Remington, 2010; Whittemore and Knafl, 2005). This study used the MMAT, mixed methods appraisal tool, and the CASP critical appraisal skills programme to maintain the scientific rigor of this stage or the review (Pluye *et al.*, 2011). Healthcare professionals have piloted these tools and have undergone periodic revisions to maintain them as valuable and appropriate for health sciences research. Permission was sought and granted by the authors for using both tools in this review.

3.4.2 Data Analysis

Data analysis necessitates explicit and systematic methods to refine conclusions' accuracy. Whittemore and Knafl (2005) offer guidelines to improve the methodology in this stage of

the review process. These guidelines informed the data reduction, display, comparison and conclusion-drawing processes in the data analysis stage of this review.

3.5 SUMMARY

This chapter discussed the data evaluation stage, comprised of data extraction and quality appraisal process; finally, the data analysis stage, comprised of data reduction, display, comparison and conclusion drawing, was discussed. The methodological rigor employed in each stage was also discussed.

The next chapter discusses the review findings as well as the synthesis process.

CHAPTER FOUR

PRESENTATION OF FINDINGS

4.1 INTRODUCTION

This chapter forms the concluding phase of the integrative review, wherein the results of the review are given. The appraisal of evidence is discussed in detail, along with the characteristics of included studies as well as their methodologies. Finally, there is a narrative presentation of thematic findings and an inductive synthesis of information. The first section comprises an overview of the interpretation and presentation stage of the review.

4.2 INTERPRETATION AND PRESENTATION

The presentation stage of the Integrative review is the fifth and final phase of the review and is where the interpretation of results is made and shared. Integrative reviews conducted with systematic rigor may present a wholistic understanding of a particular factor relevant to healthcare, potentially enhancing its scientific knowledge base (Whittemore and Knafl, 2005; Souza *et al.*, 2005; Russel, 2005). One way in which a review expands the scientific knowledge base of a field of study is through the integrative synthesis of new information (Toraco, 2016). Synthesis is a creative exercise which arises out of the author's deep and intimate knowledge of a topic leading to the weaving of a new whole from the ideas and elements found in sources included for the study (Toronto and Remington, 2020; Toraco, 2016). Any synthesis must be substantiated by evidence, and a logical chain of evidence and reasoning must be given to give any reader ample proof of the accuracy of conclusions (Whittemore and Knafl, 2005). Appropriate rules of inference must be attended to when making conclusions in order to preserve validity, and assumptions should be explained by the reviewer when drawing inferences (Russel, 2005). Conclusions are best visualised in tables or diagrams. All methodological limitations of the review must be explicitly stated for transparency and as evidence of scientific rigors employed to decrease bias (Whittemore and Knafl, 2005; Souza, 2010). Russel (2005) suggests that evidence from single studies should be clearly delineated from that from reviews. While an integrative review has the benefit of combining extensive evidence across various methodologies, the reviewer must

isolate key concepts in order to summarise the evidence into an integrated report rather than a series of summaries (Beyea and Nicoll, 1998).

4.3 RESULTS

This review aimed to identify factors that determine mental health among rescue workers. Information was garnered from a literature search across seven databases, including SCOPUS, PsycINFO, PubMed, ProQuest Nursing and Allied Health Database, Academic Search Complete, CINAHL, and Psychology and Behavioral Sciences Collection for published and unpublished literature from January 2010 to December 2019. The search yielded 241 finds of potentially relevant literature, 220 from the electronic literature search, six (6) from hand journal searches and 15 additional articles from an ancestry-search. Duplicates were discarded, and the remaining articles were censored by title and abstract, leaving 74 full-text studies. These articles were then appraised for relevance against the inclusion and exclusion criteria, yielding a remainder of 19 articles from which date was extracted to address the research question.
(Refer to **figure 2.2** for the PRISMA flow chart depiction.)

4.3.1 Study Characteristics

In order to answer the research question posed within this study, predefined and validated extraction tools were employed to garner relevant information from the included studies **(Refer to Appendix A, C and E).** Distinguishing characteristics from the included studies are recorded in the following section.

4.3.1.1 Study location

Studies included in this review comprise information which is representative of publications from 4 continents. Ten (9) papers are from North America, all of which are from the United States of America, five (5) are from Asia (2 from China, and 1 from Thailand, Pakistan and Korea) three (3) are from Europe (1 from the United Kingdom, Germany and Portugal) and two (2) from Australasia (1 from Australia and 1 from New Zealand).

4.3.1.2 Research method and study designs

Amongst the primary studies included, 16 were qualitative, 1 was quantitative, and 2 were mixed-method studies. The qualitative study designs employed phenomenological, grounded theory, correlational and descriptive design approaches. The quantitative study used a descriptive case series approach. The mixed-method study used a cross-sectional survey and a narrative coding approach.

4.3.1.3 Study population and sampling

Participants included in this study were predominantly firefighters and police officers with a combination of other emergency rescue workers, including nurses, doctors, ambulance drivers and emergency tele-communicators. The sample size for each study ranged from 12 to 16 424 rescue workers of varying backgrounds, with the total sample size amounting to 30 878 (29 876 participants from qualitative studies, 81 from quantitative studies, and 921 from mixed method studies)—primary studies across methodologies utilized predominantly convenience sampling, followed by purposive sampling and cluster random sampling.

***4.3.1.4** Data collection and analysis*

Most of the included qualitative studies used questionnaires and surveys to gather data for their studies. However, some studies employed focused interviews and group counselling. Multiple regression analysis and descriptive statistical analysis accounted for the most widely used data analysis method amongst included qualitative studies, with narrative coding, correlational analysis and statistical package for social sciences (SPSS) comprising a minority. Qualitative studies also gathered data using survey and questionnaire-based approaches, as well as one study which gathered biological markers (blood and saliva). Narrative coding and directed qualitative analysis were used to analyse data of an "open-ended" nature, and to a limited extent, Analysis of variance (ANOVA) was employed.

4.3.1.5 Study journals

Seventeen (17) published articles were included in this study, all of which came from various medical, psychological and medical journals; two (2) unpublished studies were included,

which were dissertational theses. Publishing journals included: Stress Health, Counselling Psychology Quarterly, Journal of Psychiatric Research, The Journal of Individual Psychology, Pakistan Journal of Psychological Research, Environmental Health, Journal of Environmental Medicine, Journal of Preventive Medicine and Public Health, Psychological Trauma: Theory, Research, Practice and Policy, Workplace, Psychological Medicine, Anxiety Stress and Coping Journal, Cognitive Therapy and Research Journal, Nurse Education in Practice Journal, Psychopharmacology Journal, New Zealand Journal of Psychology, and Disasters. None of the studies were published in the same journal. (Refer to **Table 4.1**)

Table 4.1: Study origin by journal

Journal	Number of studies	Country	Quality	Impact Factor
Stress & Health	1	United States	Q1	3.519
Counselling Psychology Quarterly	1	United Kingdom	Q2	1.435
Journal of Psychiatric Research	1	United Kingdom	Q1	4.410
The Journal of Individual Psychology	1	United States	----	----
Pakistan Journal of Psychological Research	1	Pakistan	Q4	0.43
Environmental Health	1	Germany	Q2	3.458
Journal of Environmental Medicine	1	United States	Q2	1.670
Journal of Preventive Medicine and Public Health	1	South Korea	Q2	1.520
Psychological Trauma: Theory, Research, Practice and Policy	1	United States	Q1	2.47
Occupational and Environmental Medicine	1	United Kingdom	Q1	3.330
Psychological Medicine	1	United Kingdom	Q1	5.60
Anxiety Stress and Coping Journal	1	United States	Q1	2.80
Cognitive Therapy and Research Journal	1	United States	Q1	2.260
Nurse Education in Practice	1	United Kingdom	Q1	2.240
Psychopharmacology	1	Germany	Q1	3.97
New Zealand Journal of Psychology	1	New Zealand	Q2	0.86
Disasters	1	United Kingdom	Q1	2.48

4.3.2 Participants Characteristics

The majority of participants per subgroup size were sixteen thousand, four hundred and twenty-four (16349) “rescue/recovery workers” registered with the World Trade Centre Health Registry, albeit without information regarding their specific roles, qualifications or experience. Ten thousand, two hundred and forty-seven (10217) participants were police officers across a broad range of work experience and educational levels, whose inclusion

criteria across studies was primarily their exposure to the event of study. One thousand, eight hundred and twenty-five (1825) participants across studies were firefighters; while the majority of these studies did not have experiential work parameters for inclusion, there was one case study which included a firefighter with extensive experience and expertise; furthermore, another study only included professional firefighters who were actively working and not still in training. One study which included firefighters required participants to be older than eighteen (18) years of age; while there were no other experience parameters for inclusion, a mean of 13.4 years of firefighting experience was found within this study with a standard deviation of 8.1 years. Participants for the remainder of the studies included one hundred and thirteen (113) ambulance drivers, nine hundred and ninety-eight (998) EMS responders, three hundred and twenty-three (323) 9-1-1 tele-communicators, and one hundred and three (103) nurses for whom no word experiential parameters were required for study inclusion, only exposure to the event of study. One study of EMS professionals required participants to be older than eighteen (18) years, while another study mentions that participants had rescue work experience ranging from 1 to 12 years.

4.3.3 Methodological Quality Score

Included qualitative, quantitative and mixed-method studies were assessed for quality, detailed in table 3.2, 3.3, and 3.4, respectively. Qualitative studies were assessed using the Critical Appraisal Skills Program tool (CASP), 2018 version, giving quality scores ranging from 7 to 10 out of possible score of 10. Most of these studies which scored poorly were due to recruitment strategy compromised because of convenience sampling, such as studies which used registries, which are notorious for under-representing the actual affected population; others had ineffective recruitment strategies which yielded sample sizes inadequate in generating any statistical power. Furthermore, a minority of the studies did not achieve data content capable of addressing the research problem through inadequate study methodology or design.

The Mixed Methods Appraisal Tool (MMAT), designed by Pluye *et al.* (2011), was employed in the appraisal of the quality of quantitative studies, yielding scores of 100% out of a possible 100% quality rating **(Refer to table 3.3)**. The MMAT was also used to appraise 2 included studies which combined methods, yielding a score of 100% for the one study but

89% for the second because the cross-sectional component may not have yielded data capable of addressing the longitudinal nature of the issue under study.

4.4 THEMES

The synthesis of findings regarding interventions promoting rescue workers' mental health were determined during this review. These findings were summarized and coded according to the following themes: “commitment to humanity”, “the intrinsic nature of rescue work”, “rescue workers are also the survivors of trauma”, “health-related quality of life”, and “mental health support”. The finding of this study comprised a total of 5 themes and 12 subthemes (**Figure 4.1**).

4.4.1 Theme 1: Commitment to Humanity

4.4.1.1 Acting out of selflessness

The synthesized findings revealed that rescue workers, regardless of their training or professional background, act selflessly to serve the needs of those suffering or in distress. A retrospective study on nurse rescue workers in the wake of the Katrina hurricane asserts that regardless of particular demographics or qualifications, these people are called upon to help whenever disaster strikes (Urrabazo, 2012; 1). Furthermore, the study describes the nurses’ ability to put their personal issues on hold because of the onus placed upon them by victims and patients.

Rescue workers prevent death or minimize injury and offer timely rehabilitation and treatment, reducing suffering and destruction in affected communities. This impetus is expressed in a case study quote: "I just want to save everyone. I'm the guy up on the roof, cutting through the roof...” (Garner *et al.*, 2016; 171). Elsewhere despite having the required skill to help victims, rescue workers were frustrated by external factors such as shortages of medications and emergency supplies, which posed barriers to their desire to assist or serve victims of the Chinese earthquakes (Wenji *et al.*, 2015; 80). Rescue workers put their lives and safety at risk in order to help others, a decision guided by their assessment of risk to self as well as personal beliefs and value systems (Haleem *et al.*, 2017; Wenji *et al.*, 2015).

4.4.1.2 Motivating factors

The rescue worker draws his/her motivation from a heterogenous pool of incentives even in the face of danger and human suffering. A sense of duty, professional pride and strong religious beliefs were found to be strong motivators for humanitarian efforts among rescue workers (Feder *et al.*, 2016; Haleem *et al.*, 2017). Disaster relief workers are traditionally compassionate in their delivery of aid. However, Urrabazo (2012) cautions with the sobering realization that there are times when not all disaster victims and patients may be helped.

4.4.2 Theme 2: The Intrinsic Nature of Rescue Work

4.4.2.1 Occupational hazards of rescue work

Working conditions during and after natural disasters are challenging and often done in the absence of elementary yet indispensable necessities like electricity, running water, assurances of personal safety, and supply logistics, leading to shortages of food, medication and other supplies; a reality often compounded by a shortage of personnel adequately trained to provide the required care interventions under such extenuating circumstances (Urrabazo, 2012; Wenji *et al.*, 2015; Chongruksa *et al.*, 2012; Haleem *et al.*, 2017). The context of rescue work has been described as complex and dynamic, exacting a high physical and psychological cost in the form of non-fatal or fatal injuries and trauma-related psychological illnesses (Feder *et al.*, 2016). In their cross-sectional analysis of police and firefighters deployed during the aftermath of Hurricane Katrina, Komarovskaya *et al.* (2014) noted that this cohort was exposed to unique stressors such as physical injuries, prolonged shift times, sleep deprivation, hostile responses from communities served, destruction of their homes (for local responders) and distance from loved ones and families.

A study by Wenji *et al.* (2015), involving exhaustive interviews with a cohort of 12 Chinese nurses deployed to the disaster zone in the wake of the Yushu earthquake, a 7.1 magnitude earthquake which struck the Qinghai province, documents similar challenges such as hampered access to affected communities, mutilated health facilities, as well as cultural differences and language barriers (this cohort was deployed to areas inhabited by predominantly Tibetan speaking people). The Yushu disaster zone was located upwards of 2261 meters, and due to the urgent nature of the disaster, rescue workers were dispatched

from low altitudes with no time for acclimatization; a reality which led to many suffering the effects of altitude sickness, which included nausea, breathlessness and fatigue (Wenji *et al.*, 2015). On September the 11th of, 2001, the terrorist attacks on the New York World Trade Centre (WTC), involving two aircraft piloted directly into the two towers, caused over two and a half thousand immediate deaths and a large number of casualties over the days which followed (Jordan *et al.*, 2019; Schwarzer *et al.*, 2013).

In the wake of this tragedy, thousands of survivors, rescue workers and local residents were exposed to unprecedented volumes of potentially harmful air particles emanating from burning jet fuel, crumbling buildings, unextinguished fires and scenes of inordinate psychological trauma (Jordan *et al.*, 2019). Rescue workers such as police officers, amongst others, who were first to arrive on the scene witnessed people jumping from the towers, which were engulfed in flames and rapidly crumbling; notwithstanding, they provided succour to as many as were reachable and secured the perimeter of the WTC, guarding temporary morgues and took part searching for bodies (Schwarzer *et al.*, 2013; Pietrzak *et al.*, 2013). Due to the magnitude of the event, psychological and physical hazards remained at large during the following months, including fear for personal safety, injury or illness, and long and unpredictable working hours (Jordan *et al.*, 2019; Pietrzak *et al.*, 2013).

During the World Trade Centre attacks, nearly 400 first responders lost their lives while serving the needs of others, proving that death is also a looming possibility for rescue workers (Urrabazo, 2012). A longitudinal study on the terrorist attacks in Thailand during 2004-2009 estimates that about 200 Yala police officers were injured during the violence (Chongruksa *et al.*, 2012; 84). Self-report methods used on the cohort in this study revealed that the potential of harm or death from terrorist attacks was a recuring theme, especially during transit to and from work. Furthermore, many rescue workers reported having lost their colleagues to traumatic acts of violence such as shooting or bombing.

Findings from a mixed-method study by Swab (2020) encapsulate the work climate in public health as being demanding and disruptive through shift work, leaving little time for adequate sleep, nutrition, exercise and family time. Notably, the study found that emergency workers perceived their work as stressful and that working shifts greater than 24 hours was not uncommon amongst the study cohort. Findings from a cross-sectional analysis conducted on 535 South Korean firefighters attest to the onerous demands of rescue work, whereby

over 78% of participants' work hours exceeded 40-hour weeks (Kim *et al.*, 2019; 348). In addition to strenuous and hazardous work conditions, the National Fire Service Personnel Psychological Assessment Report conducted in 2004 in Korea determined that firefighters are exposed to an average of 7.8 extreme trauma events per year, with a PTSD prevalence over 10 times that of the general population (Kim *et al.*, 2019; 349).

An emergency rescue worker from Chicago aptly portrays the taxing work environment in the following quote: "*Years of collecting skeletons, poor wages, and gruelling hours caught up to me. I got to the point where reliving the 'bad calls' became too much. I left EMS*." (Swab, 2020; 115). The same emergency worker went so far as to admit that they had considered suicide.

In Portugal, a retrospective longitudinal study of 651 firefighters found that physical and psychological danger were accepted parts of the occupation, making it a highly-strenuous occupation (Ângelo and Chambel, 2013; 107). Police, firefighters, ambulance personnel, and other emergency service workers function in a context in which they are more likely to be exposed to potentially traumatic events on a regular basis and often involving casualties such as mass vehicle accidents, medical emergencies, hazardous chemical or material exposure, as well as fires. This group is at risk of negative psychological impact from exposure to multiple traumas, seen in elevated rates of irregular sleeping patterns, substance abuse, anxiety, depression and posttraumatic stress disorder (PTSD) (Ângelo and Chambel, 2013).

A randomized control trial by Lilly *et al.* (2019) documented the highly stressful work environment of emergency medical dispatchers, an atypical group of first responders who provide life-saving instructions over the phone, often being the last people who are spoken to by injured victims who may not be able to be saved. The nature of rescue work is proposed to account for the high prevalence of psychological and physical health symptoms amongst rescue workers when compared to the population at large (Lilly *et al.*, 2019; 705). A mixed-method study on EMS professionals conducted by Swab (2020) found that EMS professionals incur high levels of stress because of the nature of their job, which is further compounded by stressors outside of work. Notwithstanding, the stress incurred from working in the EMS profession was identified as the most significant life stressor within this

cohort, exceeding stress associated with other life issues such as finances, relationships, higher education, and caregiver responsibilities (Swab, 2020; 161).

4.4.2.2 Resources on the frontline

In 2005, the United States suffered an unprecedented natural disaster when Hurricane Katrina Struck with gale-force winds and subsequent flooding, leading to fatalities and mass destruction of infrastructure (Komarovskaya *et al.*, 2014). The sheer magnitude of the disaster disrupted even the most basic of commodities. Electricity supply was cut off with the implication for health centres of needing to perform manual ventilation and improvising of IV drug administration pumps for critically ill or wounded; supply logistics were compromised, leading to shortages of food, medication and other supplies resulting in rationing; a lack of running water led to inadequate sanitation necessitating workers and patients to use buckets or bags for ablutions (Urrabazo, 2012; 7). These makeshift conditions were often further compounded by an influx of acute injuries during the peri-disaster phase.

Rescue nurses who worked in the aftermath of Hurricane Katrina attended treatment centres which were set up in what previously were restaurants or airstrips, where myriad procedures had to be done, such as delivering babies and tending to alligator and snake bites, as well as managing patients with chronic conditions such as chronic obstructive respiratory diseases, diabetes and hypertension (Urrabazo, 2012; 31). Caring under these circumstances necessitated utilizing skills and implementing activities which minimise the impact of disasters on health and life-threatening damage; foremost of these is the ability to adapt existing services to meet the needs of the situation at hand.

In response to the Yushu earthquake, teams of doctors and nurses were deployed to affected areas as part of China's Response Plan. Nurses comprised the majority of the deployed rescue workers, indeed, they comprise the most numerous group of health care workers globally (Wenji *et al.*, 2015). While working on the frontline, they were central in the coordination of disaster relief efforts, assuming roles which included care providers, educators, counsellors, and triage officers (Wenji *et al.*, 2015; 75). Naturally nurse rescue workers gain valuable experience during these missions and may inform future disaster relief interventions.

4.4.2.3 Organizational structural demand

In a mixed-method study by Swab (2020), a host of negative remarks by participants illustrated, on the part of respondents, a working culture where they felt that they were replaceable and underappreciated. Re-occurring themes were on the underlying corporate priorities of rescue services, highlighting a lack of managerial support and concern for the occupational well-being of rescue workers as well as a lack of sensitivity to the outcomes of disaster victims. Conversely, EMS workers thrived the best under the stressful emergency response lifestyle when they were surrounded by options for stress management in supportive and caring work culture, extending form family to co-worker support (Swab, 2020; 158). Elsewhere in a retrospective study on Portuguese firefighters by Ângelo and Chambel (2013), participants reported the challenges created by organizational structures withing rescue service entities whereby supervisors were reported to be unreceptive of innovative ideas suggested by subordinates who had recently undergone specialized training. Furthermore, poor coordination with allied emergency rescue services at the emergency site often led to situations giving rise to a conflict of values amongst firefighters. In her cross-sectional study of 91 New Orleans nurses who assisted in the disaster response to Hurricane Katrina, Urrabazo (2012) recognized heightened anxiety when circumstances challenge nurses to act outside their traditional ideals and beliefs on nursing.

Chongruksa and colleagues (2012) found that many of their study participants struggled with stress arising from unfair treatment from commanding officers, a lack of support and dissatisfaction with general working conditions and remuneration under challenging and potentially dangerous post-disaster conditions. This lack of supervisory support and equity was presumed to cause the attenuated intervention impact after one month (Chongruksa, 2012; 94). Nurses who assisted in the disaster response to Hurricane Katrina reported a heightened sense of anxiety when circumstances challenged nurses to act outside of their traditional ideals and beliefs on nursing (Urrabazo, 2012).

The foresight to anticipate disaster relief needs is critical, though, throughout this study, it was clear that prior preparation of staff and the planning of medical equipment logistics or supplies had not been proactively considered by leaders. Participants reported not only being educationally under-prepared but also lacking emotional preparation, personal effects, and daily survival needs such as food and water (Wenji *et al.*, 2015; 80).

4.4.3 Theme 3: Rescue Workers Are Also the Survivors of Trauma

Rescue workers are the unexpected victims of disasters who, like the people they assist, may also be residents of the community affected by disasters. As members of a community, they too may suffer the loss of their homes, relatives, employment, transportation, prescription medications, necessary documents, and life as they were accustomed to (Urrabazo, 2012; Swab, 2019). Trauma is seldom assessed from the perspective of rescue workers but has been shown to affect them in the form of occupational injuries and illnesses, depressive disease and post-traumatic stress disorder (Garner *et al.*, 2016). Counsellors need to be mindful of the phenomenon that first responders are survivors who sustain personal trauma and who have their own need for coping resources, recovery and healing; despite the social construct which expects them to be beyond the traumatizing effects of working in disaster response (Garner *et al.*, 2016; 15). Nurses are called upon to be at the forefront of healthcare following disastrous events. During this process, nurses are expected to put their emotions on hold and care for the victims of the disaster. What many fail to realize is that these nurses, too, are victims, suffering the same fears and losses as those patients they care for (Urrabazo, 2012).

A longitudinal study on the terrorist attacks in Thailand from 2004 to 2009 estimates that about 200 Yala police officers were injured during the violence (Chongruksa *et al.*, 2012; 84). Self-report methods used on the cohort in this study revealed that the potential of harm or death from terrorist attacks was a recuring theme, especially during transit to and from work. Furthermore, many rescue workers reported having lost their colleagues to traumatic acts of violence such as shooting or bombing. During the World Trade Centre attacks, nearly 400 first responders lost their lives during rescue efforts, a poignant testimony to the reality that death is also a looming possibility for rescue workers (Urrabazo, 2012).

Surgenor *et al.* (2015) revealed in their mixed-method study how local first responders are not immune to the deleterious effects of disasters, especially since they may also experience personal loss of their home, sense of community, relatives and colleagues. Natural disasters such as earthquakes are non-discriminatory in damaging homes and communities, affecting rescue workers' financial and job security. The taxing effect of existing personal and occupational has also been exacerbated in loss spirals resulting from the protracted aftereffects that some disasters create (Surgenor *et al.*, 2014; 10).

When evaluating the state anxiety of the Hurricane Katrina nurses, Urrabazo (2012) found their mean scores to be higher than the established norms; highlighting that events that transpire when a disaster strikes a community, both occupational or other, can leave a detrimental impact on nurses providing care during that time. This is a salient reminder of rescue work's high physical and psychological cost (Feder *et al.*, 2016).

4.4.4 Theme 4: Health-Related Quality of Life

4.4.4.1 Rigors of rescue work on personal health

Few traumas have had the degree of physical and toxic exposures involved in the WTC disaster, notwithstanding that medical conditions diagnosed after 9/11 emerged as co-morbidities to psychological illness (Feder *et al.*, 2016). Data from the Centre for Disease Control shows that rescue workers filed 1,037 injury/illness reports in the wake of Hurricane Katrina between September 8 and September 25, 2005 (Urrabazo, 2012; 47). The cross-sectional analysis by Jordan *et al.* (2019) studied 36,897 participants in the WTC Health Registry; albeit the largest and most diverse cohort of September 11th exposed persons, it is estimated to underrepresent the actual number of those exposed. Interpolation of findings puts the estimated population of exposed survivors in excess of 160,000 persons potentially struggling with either mental or physical health symptoms related to the WTC disaster (Jordan *et al.*, 2019; 12). Almost half of the enrolees in the cohort of WTC rescue/recovery workers and community members reported having sustained exposure which led to the development of either Asthma or Gastroesophageal reflux symptoms (GERD) or both. Participants with mental health-related symptomology reported the worst health-related quality of life (HRQOL) as well as unmet needs for mental health care; furthermore, these conditions were autonomously linked to limitations of daily productivity and capabilities, increasing the vulnerability of this group of individuals (Jordan *et al.*, 2019). HRQOL was found to be inversely associated with the number of co-morbid conditions. Feder *et al.* (2016) postulate that co-morbidities may exacerbate psychological symptomology in this cohort by serving as continual reminders of psychological traumas which may have been sustained during exposures on Ground Zero.

The cross-sectional analysis of a cohort of 535 Korean firefighters by Kim *et al.* (2019) helps to highlight the association between the physical rigors of their job and the impact it has on their psychological health and quality of life. Because of the chronic stress firefighters

experience at work, they may suffer from sleep irregularity which can exacerbate the development of respiratory, cardiovascular, and psychological illnesses (Kim *et al.*, 2019; Smith *et al.*, 2018).

Sleep disturbance represents a prominent occupational concern among rescue workers with a negative implication on stress management capabilities in this group (Smith *et al.*, 2018; Swab, 2020). A mixed method study by Swab (2020), employing both survey and in-depth interviews, established that 17,65% of respondents reported an average of 5 hours of sleep per night, a finding which had a negative effect on their ability to manage stress; all respondents unanimously reported perceiving their work as stressful. Out of all the life issues that were measured for stress response, the stress incurred from working in the EMS profession was identified as the most significant and prevailed over other life issues such as finances, relationships, higher education, and caregiver responsibilities.

Many of the emergency medical service entities contacted within this study offered 24-hour shifts, and emergency workers who regularly worked these shifts reported they were not as able to manage their stress when compared with those who were working shifts that were less than 24 hours in length (Swab, 2020; 73). Furthermore, by virtue of working extended shifts, these workers received a higher volume of emergency calls which was shown to hinder their ability to manage stress. Notably, a cross-sectional analysis conducted on 652 professional firefighters determined that occupational stress was strongly and independently related to sleep impedance when compared to either alcohol use severity or distress tolerance, underscoring the clinical importance of sleep on the performance of this group of professionals (Smith *et al.*, 2018; 73).

Emergency response professionals incur increased stress because of the characteristics of their job; in combination with stressors outside of work, poor coping mechanisms may be adopted with a negative impact on the lives of this workforce (Swab, 2020). Rescue workers may show great resilience in the context of their work. Despite the development of anxiety amongst a few, many of whom only have it for a transient period, the psychological impact may only be revealed later and manifested in depressive disease, substance misuse, intrusive psychosomatic symptoms such as palpitations, and psychotic effect (Chongruksa *et al.*, 2012; 84).

4.4.4.2 Vicarious traumatization

Stress in conceptualized when the person appraises their environment as taxing or endangering of his/her coping resources and wellbeing (Haleem *et al.*, 2017). In her cross-sectional study of 91 New Orleans nurses who assisted in the disaster response to the Katrina Hurricane, Urrabazo (2012), recognized a heightened sense of anxiety arising when circumstances challenge nurses to act outside of their traditional ideals and beliefs on nursing. Rescue workers can become the indirect victims of trauma by witnessing the traumas of others in their duties, which can lead to adverse psychological impacts on this group of professionals (Swab, 2020; 21).

A cross-sectional study on Korean firefighters found them more susceptible to secondary trauma resulting from occupational stress, which is common in this line of work, as opposed to primary trauma, which occurs in victims who directly experience traumatic events (Kim *et al.*, 2019; 349). Feder *et al.* (2016) note in their study amongst 9/11 responders that secondary stressors such as knowing someone who was injured during the event or other post hoc related stressors may exacerbate and project PTSD symptoms. Rescue workers sustain physical and psychological injuries that often remain hidden in their personal lives and can lead to an unhealthy paradigm; this group of workers are only now starting to gain recognition as survivors in their own right (Garner *et al.*, 2016).

Witnessing a traumatic event in person during the WTC terrorist attack included either witnessing one of the aeroplanes strike a tower, the collapse of one of the buildings, people evacuating the area or falling from a tower or someone sustain an injury or fatality (Jordan *et al.*, 2019; 2). This cross-sectional study by Jordan *et al.* (2019) reveals the impact of exposure to environmental hazards and psychological stressors and how these negatively affect rescue workers for months after the event. During the time of this study, over a decade later, the impact of these exposures continues to unravel; with nearly half of enrolees in this large cohort of 9/11-exposed rescue/recovery workers and community members reported having developed one or more of the health conditions studied (Jordan *et al.*, 2019; 12). The prospective study by Pietrzak *et al.* (2013) found that 5.3% of police responders and 9.5% of non-traditional responders experienced chronic WTC-related PTSD symptoms, with others showing subsyndromal and latent symptoms nearly a decade after the event.

Personnel that perform police, fire, ambulance, and other emergency service duties are likely to be exposed to traumatic events regularly (Joyce *et al.*, 2019; Kim *et al.*, 2019). Not surprisingly, first responders commonly report stress-related mental health conditions arising from their exposure to multiple traumas with a number of psychosomatic problems, as well as substance misuse and its associated sleep disturbance documented (Joyce *et al.*, 2019; 285).

4.4.4.3 Post-Traumatic Stress Disorder (PTSD)

The individual and societal toll associated with active PTSD and depression are significant because these conditions are associated with limitations in daily activities and a considerable decrease in productivity (Jordan *et al.*, 2019). Risk factors for PTSD have been found to vary by occupation; however, the performing of work for which responders did not feel competent or adequately trained (e.g. firefighting among police officers) was associated with PTSD in rescue workers. According to Schwarzer *et al.* (2013), the impact of witnessing horrible events induces the most stress when there is low social integration or support systems in place. Conversely, a higher perception of locus of control, preparedness or training, and emotional coping mechanisms such as positive reframing and acceptance were negatively associated with PTSD symptomology (Feder *et al.*, 2016). Within the context of WTC disaster response, it has been suggested that the higher level of training received by police responders resulted in their being better prepared to respond to trauma when compared to non-traditional responders. This finding made them less-likely to have clinically elevated patterns of exposure-related PTSD (Pietrzak *et al.*, 2013).

Certain factors have been consistently linked with PTSD symptom trajectories amongst WTC responder groups which include Hispanic provenance, a history of prior psychiatric illness, longer WTC exposure, greater medical illness sustained during or as a result of 9/11, personal stressors and post-9/11 traumas, and unhealthy coping such as substance abuse and avoidance coping (Feder *et al.*, 2016; Pietrzak *et al.*, 2013). Komarovskaya *et al.* (2014) suggest in their cross-sectional study on police officers and firefighters that there was an association between worse mental health outcomes and childhood physical abuse, especially following service during a major natural disaster. One-fifth of the study cohort reported having experienced such abuse before age 18, which was notably associated with symptoms of PTSD, depression and impaired sleep. Notably, the fatality or injury of a colleague, friend

or family member was associated with worse chronic PTSD symptomology and hampered recovering trajectories in police responders (Pietrzak *et al.*, 2013).

Amongst Hurricane Katrina nurse responders, PTSD to be the most common psychological problem afflicting them, supporting the belief that PTSD affects disaster responders (Urrabazo, 2012). The same author determined a heterogenous aetiology for PTSD following a disaster event which included demographic factors such as gender, home or property ownership in the affected area, educational foundation, and professional experience, as well as buffers such as social support, time off work, job training, debriefing, and continuing education. Elsewhere, the cross-sectional analysis by Kim *et al.* (2019) found that physical violence and psychological or sexual abuse sustained at clients' hands negatively impacted the participants' PTSD symptoms. Interestingly, both burnout and violence affected PTSD symptoms; however, trauma experience was not directly associated with PTSD symptoms (Kim *et al.*, 2019; 349). Another study found that PTSD symptoms were associated with being injured, falling ill and experiencing a water shortage, all of which may have been proxies for a perceived lack of support, resulting in increased stress (Schenk *et al.*, 2017; 794). The author reiterates this by observing that rescue workers who endured these events were more likely to develop PTSD symptoms than those who did not.

A cross-sectional study on WTC responders conducted by Jordan *et al.* (2019) investigated the incidence of medical conditions arising out of exposure sustained during rescue work, specifically asthma, gastroesophageal reflux disease (GERD), PTSD and depression and how those impacted health-related quality of life (HRQOL). While each of these conditions was found to be associated with a decreased HRQOL, the lowest HRQOL was reported by those participants with PTSD and depression. Higher respiratory and digestive symptoms were found to be associated with ongoing and chronic PTSD, highlighting the compounded impact of comorbidities of conditions. This attested to the complex relationship between hazard and trauma exposure during rescue work and the trajectory of PTSD in these professionals (Jordan *et al.*, 2019). Feder *et al.* (2016) acknowledge that medical conditions arising out of disaster response work may not only maintain but potentially worsen PTSD symptom severity because they serve as reminders of the exposure impact over time.

4.4.4.4 Burnout

Although it is not a medical diagnosis, burnout can hinder the normalcy of life, health and work as well as the care given to victims, and is common in occupations which involve a high level of responsibility, hazards and pressure. Given the nature of rescue workers' service, exposure to extreme trauma scenes is unavoidable and can impress a significant psychological impact. However, findings from a retrospective longitudinal study by Ângelo and Chambel (2013) suggest that firefighters working in the rescue mission context have a more acute propensity for the development of burnout. This is presumed to be associated with exhaustion which they experience due to higher job demands which can cause them to treat their clients or victims in a more impersonal way (Ângelo & Chambel, 2013).

Furthermore, firefighters with high levels of burnout tend to have higher perceived job demands, which can be due to a negative perception of their work or changes within their occupational environment. This gives credence to the belief that firefighters' perception of their working conditions changes in relation to their mental health status, which can be negatively impacted by occupational consequences such as burnout (Ângelo & Chambel, 2013). Some characteristics of burnout include chronic emotional fatigue, familial or relational scepticism, an altered sense of purpose in life, and ineffectiveness at work (Kim *et al.*, 2019). Findings from the cross-sectional study by Kim and colleagues (2019) suggest that there is room for improvement in firefighter's working conditions specifically to reduce occupational stress and burnout; notably, the development of PTSD may be hampered if work-related exhaustion is prevented. Occupational stress can cause burnout, which may conciliate the link between trauma experience and PTSD symptoms (Kim *et al.*, 2019; Ângelo and Chambel, 2013).

4.4.5 Theme 5: Mental Health Support

4.4.5.1 Mental health resources

Haleem *et al.* (2017) suggest that rescue workers possess psychological resources which assist them in coping well with psychological distress. These resources include efficacy, hope, optimism and resilience, amongst which efficacy was the strongest positive predictor of psychological well-being (Haleem *et al.*, 2017; 441). Rescue workers who scored higher

on psychological resources reported better mental health. The author attributed the high level of psychological resources to the Pakistani cohort in this study to their conscientious spiritual and religious beliefs, which may have moved them to aid those in need. Religion was thought to provide a motivational belief system which upholds service to humanity. Furthermore, the collectivistic culture and sense of community was presumed to allow rescue workers to experience their role positively (Haleem *et al.*, 2017; 442).

In response to the Yushu earthquake, teams of doctors and nurses were deployed to affected areas as part of China's Response Plan. The nurses who partook in the probing interview study by Wenji *et al.* (2015) divulged that nursing skills that they deemed beneficial during their commission to Yushu earthquake-affected regions included adaptability, proactive planning, and analytical skills thinking, and strong clinical knowledge and ability. Indeed, all of the Yushu disaster participants who formed part of the study cohort lamented lacking the appropriate disaster knowledge and resources before deployment on this mission, notwithstanding they made every effort to assist, albeit through ethical and professional conflict. This reiterates the value of experience highly appraised by nurses who work in such circumstances (Wenji *et al.*, 2015; Urrabazo, 2012). Nurse leaders were valued during rescue efforts for possessing the ability to bring order from chaos through planning, one area where many reported opportunities for growth within the disaster response entities (Wenji *et al.*, 2015; 79). Because of the integral role nurses play in rescue missions, it was recommended that they be consulted in future disaster planning efforts.

Psychological debriefing is a semi-structured reciprocal conversation with a vulnerable or stressed person by providing them with an opportunity to talk about their experience through prompting or open-ended questions. The efficacy of debriefing remains unsubstantiated by evidence; however, Chongruksa *et al.* (2012) recommended psychological first aid, which incorporates the attendance to immediate practical and emotional needs as disclosed by participants, as well as the provision of resources to assist and inform participants. Group counselling interventions within this longitudinal study included the interactive model of Cognitive Behavioural Therapy, religious interventions, mandala drawing, and Reality Therapy. Eclectic group counselling amongst terrorist-response Thai police was predicted to curb elevated anxiety scores, depression, and the potential for interpersonal conflict and promote adaptive coping mechanisms compared with the control group (Chongruksa *et al.*, 2012; 84). At one month follow-up, the impact of the intervention had abated; because of

unresolved stress from treatment and lack of support at the hands of supervisors, as well as dissatisfaction with remuneration and welfare. Within the context of the WTC response, the development of severe chronic PTSD symptom trajectory in police and non-traditional responders was found to be attenuated by social support from family and friends as well as supportive work culture and community (Pietrzak *et al.*, 2013). Schwarzer *et al.* (2013) determined in their longitudinal study on WTC responders that social integration enabled people to cope better with adversity, creating a buffering effect against sever stress response in police responders.

The experience of traumatic events in the absence of social support resulted in the highest stress level. This underscored the importance of organizational support within emergency response entities as well as an effort to increase familial and social support during disaster response operations. Similarly, the cross-sectional study on Chinese rescue workers conducted by Schenk *et al.* (2017) found that workers who held regular supportive discussions with their colleagues and ongoing communication with family and friends were less likely to experience PTSD symptoms. Elsewhere, a greater sense of purpose in life and a greater perception of social support was found to be positively associated with the low-symptom trajectory of PTSD amongst WTC responders (Feder *et al.*, 2016; Garner *et al.*, 2016).

A mixed-method study on emergency response workers by Swab (2020) surveyed positive influences in this workforce that potentially augmented their ability to manage stress. These included administrative support of rescue workers within organizations, stress management training incorporation as part of formative and continuous training, and access to stress management resources and programs. Respondents believed that their families needed support because they were cited as part of their support when dealing with stress or adversity, and also indicated that they engaged in hobbies such as sports, music, exercise and religious activities to manage their stress (Swab, 2020; 170). It was suggested within the study that enhancing and incentivising these activities through opportunities such as reduced membership fees to exercise and recreational facilities could be administrative considerations for their employers. According to Garner *et al.* (2016), programs that trained first responders in emergency management stood to benefit from integrating mindfulness and interpersonal training, promoting the therapeutic benefits of developing social support into their curriculums.

A mixed-method study on firefighters conducted by Sünram-Lea *et al.* (2011) highlights how the level of blood glucose at the time of exposure to a stressor can modulate the release of glucocorticoids as well as glycogen breakdown, with an increase in blood cortisol potentially having a suppressive effect on cognition and an increase in glycogen breakdown potentially hampering physical performance. Based on their results, the authors suggest that the ingestion of a glucose drink may comprise a cost-effective means of enhancing mental and physical performance in stressful instances that require physical performance (Sünram-Lea *et al.*, 2011; 84).

4.4.5.2 Coping mechanisms

Emergency response professionals incur increased stress because of the rigors and nature of their work; this stress, coupled with stressors outside of work, has been shown to increase their propensity for negative coping mechanisms, which can be detrimental to their professional and personal lives (Swab, 2020; 159). Novel findings are presented in a longitudinal study conducted on WTC police responders on potentially adaptable psychosocial factors that may attenuate negative symptom trajectories such as a feeling of efficacy in rescue-related activities, less detachment or avoidance coping, a broad paradigm and a sense of purpose, and lower substance-related coping (Feder *et al.*, 2016; 73). Substance coping has been identified as one of the highest distinguishing factors found between high-symptom and low-symptom trajectory responders, while turning to religion and social support, though not negatively associated with PTSD symptomology, was found to be a less harmful option for coping amongst symptomatic responders (Feder *et al.*, 2016; 76). Furthermore, the ability to keep or regain a sense of purpose and significance in life was beneficial since traumatic scenes following major disasters may challenge the world view of rescue workers. Perceived preparedness was highly esteemed by participants within this longitudinal study and concluded to be the strongest distinguishing factor between the symptomatic and non/ low- symptomatic group (Feder *et al.*, 2016; 77). Active coping such as acceptance, and positive emotion-focused coping such as humour or positive reassessing, were reported more often in participants with lower symptomatic trajectories of PTSD. Conversely, Urrabazo (2012) noted Hurricane Katrina rescue responders that trauma victims who use avoidance coping are prone to ruminate about their traumatic experiences, increasing their risk for PTSD.

A cross-sectional study on firefighters conducted by Smith *et al.* (2019) determined that sleep disturbance was a reoccurring and detrimental effect of the participants' occupational stress, distress tolerance and coping mechanisms. Alcohol-use was widely reported among participating firefighters as a coping mechanism, diminished distress tolerance, and increased sleep disturbance and daily disturbance (Smith, 2019; 73). A mixed-method study on EMS professionals conducted by Swab (2020) found that these professionals reported potentially negative coping mechanisms, such as smoking, drinking alcohol, non-prescription drug use, and increased food consumption. Of the respondents who reported using nicotine to manage stress, only 32% of them were always and often able to manage the stress in their lives; nicotine was frequently associated with stress among these professionals (Swab, 2020; 164). Participants who ingest non-prescription drugs reported the highest work-stress appraisal (Swab, 2020; 165). Contrarily, the provisions of stress management resources such as critical incident stress management (CISM) or the opportunity to confide with a family member, co-worker, or friend were positive and helpful stress-management resources for these professionals.

A cross-sectional study on nurse responders to the Hurricane Katrina disaster found that they were inclined to use task-oriented coping in managing disaster-related exposure (Urrabazo, 2012). By nature of the profession, nurses have a propensity for task-oriented coping, enabling them to prioritize the needs of others in critical situations; this was found to be pragmatic in preventing the loss of life. However, it delayed and, in some instances, prevented the nurses' from confronting their feelings (Urrabazo, 2012; 153). The buffer most reported by the study participants was social support, such as conversing with relatives and friends, followed by time off and outpatient treatment. Based on the findings from this study, the author concludes that anxiety levels and coping mechanisms are not major factors in predicting the development of PTSD in this sample of Hurricane Katrina nurses (Urrabazo, 2012; 162).

4.4.5.3 Interventions for positive mental health

Mental health is related to psychological wellbeing and intricately related to occupational health, in which one works efficaciously in managing stress and can contribute to society (Haleem *et al.*, 2017; 430). Trajectories of negative mental health can be heterogenous and can be determined by predisposing risk factors or protective factors. Social integration has

been found to serve as a protective factor enabling people to cope with adversity (Schwarzer *et al.*, 2013). The higher the exposure level, the greater the potential for stress reaction, which was reduced when higher levels of integration within a supportive community were identified. Notably, the highest stress experience was reported after witnessing catastrophic events, when the participant was more isolated from their supportive community (Schwarzer *et al.*, 2013; 23).

A prospective study on WTC police responders conducted by Pietrzak *et al.* (2013) found those police responders were prone to exhibit better adaptability and resilience to a detrimental mental health trajectory from traumatic exposure in their work when compared to non-traditional responders. Within the context of the WTC response, higher training and communal and occupational support were found to have a protective effect on the mental health of rescue workers. Early physical victimization was identified in a separate study as predisposing to mental health problems in police and firefighter personnel responding to mass incidents, alluding to the significance and impact of this risk factor which could be mitigated through screening (Komarovskaya *et al.*, 2014; 92). Schenk *et al.* (2017) propose that factors particular to individual rescue workers, such as personality traits and coping mechanisms associated with PTSD development, could potentially be considered in the delegation of rescue workers to provide adequate resources throughout the deployment.

Identifying such individuals before an emergency response will allow adjustments to tasks, the number of hours worked in a day and the length of deployment. Though there are beneficial evidence-based interventions for managing psychological distress amongst police responders, Stern *et al.* (2019) propose that it could be more beneficial to officers that more proactive or preventive interventions be developed to bolster their resilience before they require treatment of management. However, Urabazzo (2012) makes the case that until the cost-effective benefit of preventive rather than curative interventions or disaster planning can be shown, disagreement will remain amongst advocates of either philosophy. Nevertheless, A mental health impact amongst these workers underscores the impact of rescue work, particularly on those with an existing history of psychiatric illness and high trauma exposure. It accentuates the value of interventions on their behalf (Pietrzak *et al.*, 2013; 206).

A cross-sectional study on WTC responders revealed a prevalence of asthma, GERD, PTSD and depression, with comorbidities being common and related to decreased HRQOL (Jordan *et al.*, 2019). The persistently high prevalence of these conditions and their chronic trajectories amongst the survivors several years after exposure reiterates that they may need long-term recourse. The authors of the study note that responders who report poorer HRQOL have higher levels of unmet mental health needs despite the availability of care for 9/11 responders. This has prompted the authors to prescribe outreach to inform exposed persons of the availability of health resources and long-term monitoring (Jordan *et al.*, 2019; 13).

A primary finding from a randomised control trial on New South Wales firefighters conducted by Joyce *et al.* (2019) was the predictive risk for PTSD and depression as long as six (6) months later in participants with low self-reported resilience at baseline. This prompted the authors to suggest that there may be some merit to examining resilience as a more effective means of screening for rescue workers with higher levels of adaptive qualities since it is a malleable construct upon which targeted interventions may be implemented to enhance the mental health of the rescue worker over time (Joyce *et al.*, 2019; 285). Therefore, focusing on factors which enhance adaptive resilience among first responders may improve their ability to manage the potentially traumatic events that remain an unpredictable yet inherent aspect of their work. Notwithstanding, despite its potential benefits, to date, mental health screening based on enquiring about early symptoms has yet to be proven to have substantive benefits (Joyce *et al.*, 2019). Given the nature of rescue work, avoiding scenes of graphic violence of calamity is almost impossible and carries a psychological impact. However, considering the recommendations from a cross-sectional analysis by Kim *et al.* (2019), controlling for occupational exhaustion may be a potential intervention area. Occupational stress is more closely related to sleep disturbance than either alcohol intake or the inability to tolerate stress, emphasizing the clinical implication of occupational stressors on this cohort (Smith *et al.* 2019).

Specific interventions suggested for this group of rescue workers included discussions regarding the value of sleep in high-stress occupations, associations between alcohol use on sleep disturbance and the untenable relationship between sleep disturbance and stress tolerance (Smith *et al.*, 2019; 73). The authors also suggest training that could enhance adaptive coping, such as emotion-based coping mechanisms and the avoidance of substance

use, as well as referral for maladaptive substance abuse. In the wake of two major earthquakes in China, in the Hubei province, Wenji *et al.* (2012) conducted in-depth interviews with nurses who participated in disaster relief work, yielding a rich narrative of valuable insights into potentially modifiable factors which could have enhanced the experience of these workers during their service to the affected communities.

The ability to thoroughly anticipate potential disaster relief needs is critical. Nevertheless, evidence from the study participants suggests that prior staff training and conditioning, as well as medical equipment and supply logistics planning, had not been considered by leadership or management. Participants were not only lacking in clinical capabilities and skills but also emotionally underprepared, emphasizing a need for the powers across China to develop disaster nursing education policies and programs that can be incorporated into formative training (Wenji *et al.*, 2015; 80). In this study, the authors reiterate the hazardous nature of such a working environment and highlight the need for nurse responders to be healthy, fit and able to adapt, insinuating that this must be a consideration provided for during the allocation of rescue personnel on rescue missions. Based on the challenges they faced, participants believed that nurses with the requisite knowledge needed to be consulted in disaster planning and deployment initiatives to facilitate a working knowledge of disaster management knowledge and skills which could assist them to work more efficaciously on future missions (Wenji *et al.*, 2015).

Throughout the cross-sectional study on medical rescue workers commissioned to the Yushu Earthquake, a perceived lack of food and water was identified as potential proxies for a perceived lack of support, resulting in increased stress; whereas engaging workers about resourcing and support was suggested as a simple way of recognising those with the greatest needs during a disaster response (Schenk *et al.*, 2017; 798). Workers with frequent supportive talks with their teammates and regular communication with family and friends were less likely to experience PTSD symptoms. Strategies suggested for mitigating the development of chronic or latent PTSD included facilitating communication networks to family and friends during a disaster response, which would help sustain a support system. A non-significant finding within this study concerning body disposal suggests that outsourcing rescue workers who are not local to the response area could help to minimise PTSD trajectories amongst these professionals (Schenk *et al.*, 2017; 798).

Free text responses from participant rescue workers of a mixed method study by Swab (2020) reflected the significance of both occupational and personal pressures over the rescue mission on first responders exposed to the disaster's effects earthquake. This furnished valuable insight into how this group of workers perceived personal resources and possession loss. Based on the model utilised in the study, it was suggested that awareness of this loss and interventions to manage or restore these resources could lead to improved outcomes (Swab, 2020; 12). Respondents also revealed that organizations did not provide stress management resources and were urgent about the need for administrators to promote and support a caring work culture extending to family and co-worker support. One of the themes repeatedly identified in the survey responses was the need for emergency response managers to create a caring administration, recognizing the significance of providing stress management resources and advocating for and promoting their use.

Swab (2020) also identified that comprehensive stress management training was needed and suggested human resource management education to assist emergency response administrators in planning and rolling out such training. This study also highlighted that extended-hour shift work was reported as being unconducive to healthy sleep, amongst other negative consequences. Personnel working extended shifts reported working greater than the average 40-hour work week, and in parallel, their emergency call volume responses were higher than those who were not working extended shifts; such participants also indicated a propensity for being less able to manage stress. In consideration of this, it was suggested by the author that EMS administrators investigate alternatives in work schedules, possibly mitigating the taxing impact from long shifts that extend beyond 16 hours, such as policies which permit sleep while on duty should it be deemed beneficial (Swab, 2020). A randomised control trial on emergency tele-communicators found that tailor-made online mindfulness-based intervention (MBI) led to a potential reduction in reported stress (Lilly *et al.*, 2019). Greater positive change in mindfulness scores, though non-significant, was associated with lower stress after the intervention and at follow-up, suggesting that mindfulness could potentially account for reductions in stress symptom scores among intervention participants (Lilly *et al.*, 2019; 710).

Cognitive performance and, to some measure, physical strength and stamina were affected by glucose beverages in a mixed-method study in firefighters, suggesting some merit in their use to enhance these faculties under high-demand conditions (Sünram-Lea *et al.*, 2012). A

greater increase in grip strength after fire-fighting exercises and enhanced recall of previously learned information was shown under situations of stress, as in the performance of firefighting exercises (Sünram-Lea *et al.*, 2012; 94). Based on the results of this study, glucose- and caffeine-containing energy drinks might be a simple and inexpensive way to enhance optimal mental and physical performance levels and mitigate some of the deleterious effects of stress.

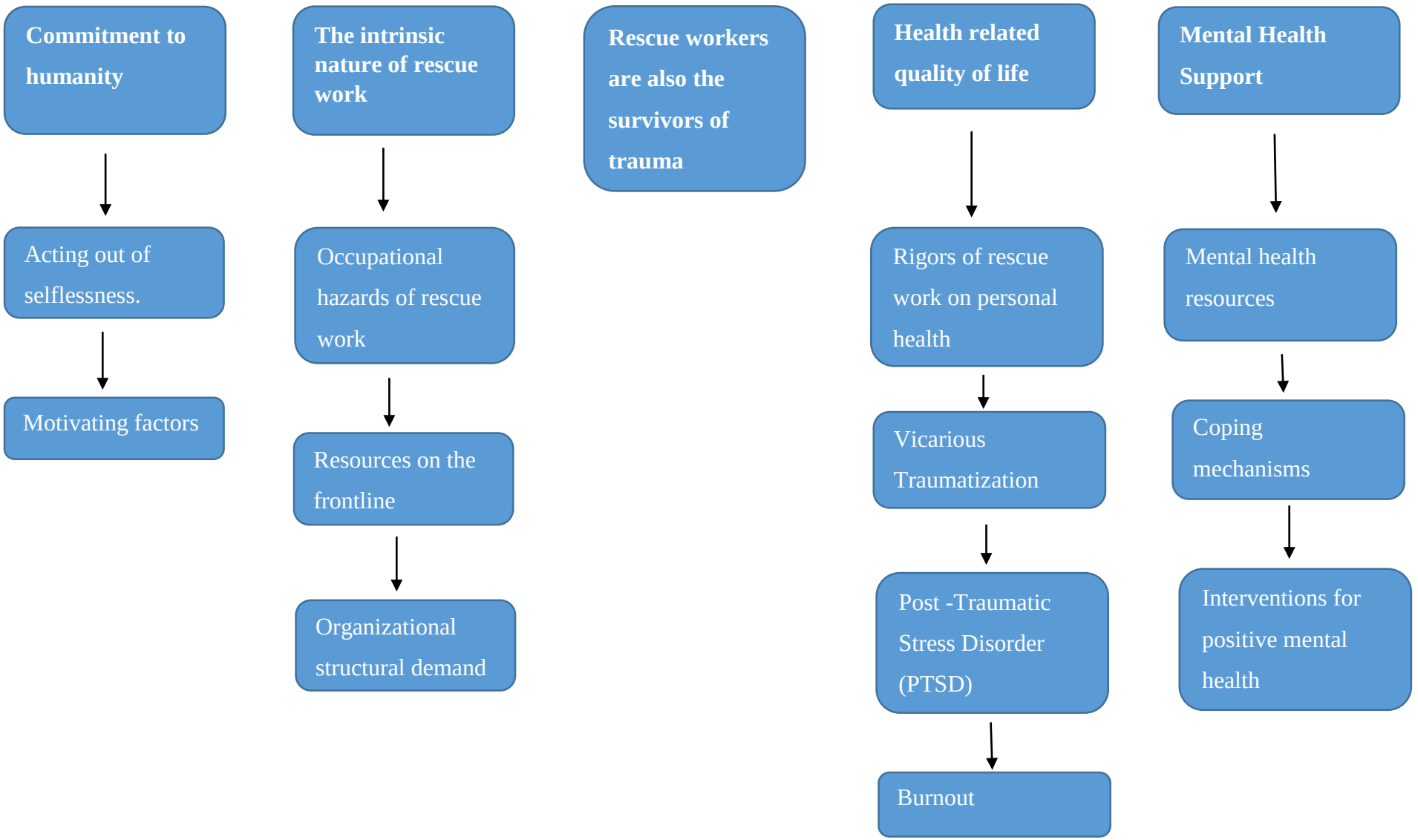


Figure 4.1: Overview of synthesized findings.

4.5 METHODOLOGICAL RIGOR

Following the data analysis process in chapter 3 of this study, data comparison was conducted whereby common themes and factors within the included studies were identified, and a conceptual map was created grouping themes and associated subthemes together (refer to figure 4.1). This was necessary to depict the empirical and theoretical evidence behind the reviewer's interpretive analysis and thematic associations. Whittemore and Knafl (2005) recommend that precise details from primary sources be extracted and displayed to display a validatory chain of evidence and substantiate conclusions, allowing the reader to determine that the findings derived from the review did not transcend the evidence. Conclusion drawing and verification comprise the final phase of data analysis and transition the review process from descriptive to reductive, whereby ideas have coalesced into generalizations. Inferring causality, which is not substantiated, is an enduring threat to validity during data analysis (Russel, 2005). During this stage, scientific rigor was maintained by faithfully cross-checking any conclusions, relationships or assumptions with primary sources to avoid premature analytic closure, and any references made included page numbers from the cited primary sources (Whittemore and Knafl, 2005). The researcher's efforts were supplemented by the support of the research supervisor and an external evaluator who cross-checked any inferences drawn from the included studies. Where necessary, the research team held a meeting to clarify any areas of uncertainty. One of the complexities encountered in this review phase was working with conflicting evidence, mainly when either view was equally compelling. As Whittemore and Knafl (2005) recommended, confounding factors were considered to identify potential weaknesses in sample selection and other methodological factors that led to the recommendation for further research.

4.6 SUMMARY

The chapter presented findings from the comprehensive research review process according to the type of data and under respective data themes. Themes within this chapter were developed by presenting supporting and, where applicable, contradicting evidence found during the data extraction process of the research. The next chapter will discuss synthesized findings and conclusions, highlight evidence gaps and make recommendations for future studies.

CHAPTER FIVE

DISCUSSION OF FINDINGS, SUMMARY AND CONCLUSION

5.1 INTRODUCTION

This chapter forms the fifth and final phase of the integrative review. It presents a wholistic understanding of the research topic with implications for practice and research (Whittemore and Knafl, 2005, Souza *et al.*, 2005; Russel, 2005). It is important to follow appropriate rules of inference when making conclusions to preserve their validity, and any assumptions regarding inferences should be overt (Russel, 2005). Syntheses must be substantiated by evidence, and a logical chain of evidence and reasoning must be given to provide readers ample proof of the conclusions' reliability (Whittemore and Knafl, 2005). In this chapter, results from the study will be presented and, where necessary, synthesized based on the integrative review process as part of the contribution to the body of knowledge on the subject matter. The implications of the findings will also be discussed along with the strengths and limitations of this study, and recommendations will be made on areas for the future inquest.

5.2 DISCUSSION OF FINDINGS

This integrative review endeavoured to search, retrieve, analyze and synthesize data related to the promotion of rescue workers' mental health and wellness. Nineteen studies met the inclusion criteria and addressed the research question, "*What are the mental health promotion interventions which can positively impact the mental health and wellness of rescue workers from January 2010 to December 2019?*". From these studies, five themes emerged, which were: Commitment to humanity, The intrinsic nature of rescue work, Rescue workers are also the survivors of Trauma, Health-related quality of Life, and Mental health support.

Humanitarian crises are on the rise, and range from natural disasters, to man-made disasters-as in the case of nuclear plant meltdowns or conflict situations such as wars or acts of terrorist (WHO, 2015). In the wake of these catastrophes, rescue workers take up the onus of attending the frontline of rescue and humanitarian efforts in affected communities. It is not uncommon for them to proceed from affected communities and themselves have suffered the disaster's effects; despite the challenges inherent in rescue work, these professionals provide timeous

rehabilitation, preventing death and minimizing injury (Haleem *et al.*, 2017; Urrabazo, 2012). The service rescue workers provide invaluable and commendable considering that they draw their motivation to serve the needs of others from a heterogenous pool of incentives that are predominantly intrinsic. Previous studies have attested to these findings listing factors such as value systems, a sense of duty, professional pride, strong religious beliefs and a desire to serve as a motivator for these unsung heroes (Feder *et al.*, 2016; Haleem *et al.*, 2017; Wenji *et al.*, 2015).

Exposure to unprecedented hazards in the wake of disasters has been well documented. These hazards differ across the spectrum of causality from natural disasters to violence and destruction created by acts of terror or wars, all of which may comprise extreme physical and psychological trauma. Historically rescue workers have been commissioned from unaffected areas as part of external or international rescue agencies to provide relief to affected communities. Considering this, they may experience isolation from their support structures, a reality potentially exacerbating the impact of the rigors and horrors of rescue work (Komarovskaya *et al.*, 2014). Factors leading to increased stress perception have been associated with a higher likelihood of developing PTSD, and Schwarzer *et al.* (2013), elaborated further that there may be a heightened appraisal of stress with isolation from one's support community. Respondents may also proceed from disaster-affected areas, which may compound the experience of trauma due to the role conflict of being a rescue worker and a victim of disaster simultaneously.

Indeed, findings which emerged from this study were enlightening on the complex trauma experienced by local rescue workers, highlighting that they experience loss on an exponential level with the loss of connectedness to their damaged communities, homes, and lost loved ones or colleagues (Surgenor *et al.*, 2015; Chongruksa *et al.*, 2012; Schenk *et al.*, 2017). Because of the nature of their occupation, rescue workers are unique in their exposure to relatively higher scenes of severe trauma and often work under rigorous and under-resourced circumstances, increasing their propensity for mental health disorders in general (Argenteiro and Setti, 2011; Counson *et al.*, 2019; Haleem *et al.*, 2017; Marks *et al.*, 2017; Skeffington *et al.*, 2016; Wild *et al.*, 2020). While working on service missions, rescue workers also reported a foreboding of personal harm which arose from extenuating conditions in the aftermath of disasters, such as working in under-resourced relief and aid facilities, hazardous pollutants which were at large, the possibility of reoccurrence of natural disasters, and the threat of violence from hostile

locals or military forces amongst others (Chongruksa *et al.*, 2012; Haleem *et al.*, 2017; Jordan *et al.*, 2019; Pietrzak *et al.*, 2013; Urrabazo, 2012; Wenji *et al.*, 2015).

Stress-related mental health conditions arising from this exposure may include anxiety and depressive disorders of varying degrees, posttraumatic stress disorder (PTSD), and sleep disturbance (Joyce *et al.*, 2019; Chongruksa *et al.*, 2012). This finding attested to the physical cost inherent within this line of work. Notably, the stress incurred from working in the emergency response profession was reported as the most significant, transcending stress related to finances, relationships, higher education, and caregiver responsibilities (Swab, 2020). The experience of occupational stress was a complex experience from one rescue worker to the next, given the varying background, formative training, and nature of challenges encountered at critical events.

Rescue work may sometimes involve critical interventions with life-and-death outcomes, especially in the immediate aftermath of a disaster. Despite commanding the required skill to help victims of disaster, rescue workers experienced frustration at barriers to care, such as inadequate allocation of emergency and food supplies as well as poor coordination of rescue efforts and supply logistics (Urrabazo, 2012; Wenji *et al.*, 2015; Chongruksa *et al.*, 2012; Schenk *et al.*, 2017; Haleem *et al.*, 2017). These challenges were widely reported amongst the respondents within this review, as reflected in the reoccurring emphasis on the value of efforts invested in disaster planning to anticipate challenges during disaster relief (Wenji *et al.*, 2015; Schenk *et al.*, 2017). This study also revealed that the provision of care in a post-disaster period necessitated specific training in order to minimise the impact of disasters on health and life-threatening damage; foremost of which was the ability to employ existing services to improve the situation at hand (Urrabazo, 2012; Wenji *et al.*, 2015).

Despite their best efforts to go beyond the call of duty, a notable theme that emerged throughout this study was that many rescue workers lamented an occupational culture where they did not feel valued or appreciated. Another re-occurring theme was the underlying corporate priorities of rescue or emergency-response services which highlighted a lack of concern by leadership for the occupational wellbeing of employees with negative implications for the outcomes of disaster victims (Swab, 2020; Chongruksa *et al.*, 2012). In principle, emergency service organizations may have resources to assist rescue workers. However, these were only effective when they were actively promoted by leadership, an issue which was found wanting in the

included studies. This prompted many authors to recommend the fostering of a culture in which supervisors more actively engaged with rescue workers in order to increase awareness of the challenges they faced to better deliver on supportive initiatives (Ângelo and Chambel, 2013; Chongruksa *et al.*, 2012; Garner *et al.*, 2016).

Rescue workers are often perceived as being beyond the effects of trauma, able to put their personal fears aside to assist others; however, they, too, share fears and traumas common to those of the casualties they assist and serve. Trauma has typically been assessed from the perspective of disaster-affected survivors; however, to a variable extent, this study enabled trauma to be understood form the perspective of responders. There is a high physical and psychological cost to rescue work, and these responders often suffer physical injuries of varying severity during their duties as well as ensuing depressive and anxiety disorders (Garner *et al.*, 2016; Feder *et al.*, 2016; Urrabazo, 2012; Jordan *et al.*, 2019). Sustaining physical injuries during missions was found to have a high association with PTSD in rescue workers highlighting the compounded impact of comorbidities of conditions (Jordan *et al.*, 2019).

Feder *et al.* (2016) acknowledge that medical conditions arising out of disaster response work not only maintained but potentially worsened PTSD symptom severity because they served as reminders of the exposure impact over time. Extrapolation of findings from a cross-sectional study on WTC responders estimates that more than 160,000 persons exhibit mental or physical injuries sustained or potentially developed during their tenure on the frontline on the WTC rescue mission (Jordan *et al.*, 2019; 12). Notwithstanding, rescue workers have been found to demonstrate hardiness in their work, with only a few ultimately suffering transient symptoms and effects; however, traumatic exposure carries a high propensity towards psychological difficulties (Chongruksa *et al.*, 2012; 84).

Occupational stress has been associated with burnout, which may conciliate the link between trauma experience and PTSD symptoms (Kim *et al.*, 2019; Ângelo and Chambel, 2013). The individual and societal toll associated with active PTSD and depression are significant because these conditions are associated with limitations in daily activities and a considerable decrease in work productivity (Jordan *et al.*, 2019). Burnout has been found to increase rescue workers' appraisal of their occupational demands, giving credence to the belief that firefighters' perception of the same working conditions changed with respect to their mental health status (Ângelo and Chambel, 2013). Notably, most rescue workers across the included studies

unanimously reported perceiving their work as stressful, increasing their propensity for adopting poor coping mechanisms (Swab, 2020). Substance use coping was among the highest distinguishing factors between the high-symptom and low-symptom trajectory groups. Turning to religion and social support, though not negatively associated with PTSD symptomology, was found to be a less harmful option for coping amongst symptomatic responders (Feder *et al.*, 2016; 76). Elsewhere, a mixed-method study on EMS professionals found that nicotine use was frequently associated with stress within these professionals and an inability to tolerate stress (Swab, 2020; 164). Finally, participants who were ingesting non-prescription drugs reported the highest work-stress appraisal (Swab, 2020; 165).

Urrabazo (2012) found that nurse responders were inclined to use task-oriented coping in managing disaster-related exposure. By nature of the profession, nurses have a propensity for task-oriented coping, enabling them to prioritize the needs of others in critical situations; which was found to be pragmatic in preventing the loss of life; however, it delayed and, in some instances, prevented the nurses' confronting their feelings (Urrabazo, 2012; 153). Trauma victims who used avoidance coping were found to be prone to ruminate about their traumatic experiences in an unresolved manner, increasing their risk for PTSD. Active coping such as acceptance, and positive emotion-focused coping such as humour or positive reassessing, were reported more often in participants with lower symptomatic trajectories of PTSD. Positive influences that could potentially augment the ability of EMS workers to manage stress included administrative support within organizations, incorporating stress management training into formative and continuous training, and access to stress management resources and programs (Swab, 2020; 170).

Traumatic scenes following major disasters may challenge the world view of rescue workers. However, maintaining a locus of control, a sense of purpose, and value in life is beneficial. Rescue workers across the included studies lamented not only being under-prepared with regard to training and conditioning but also working within a context of sparse daily survival needs such as food and water (Wenji *et al.*, 2015; Schenk *et al.*, 2017; Urrabazo, 2012; Chongruksa *et al.*, 2012; Haleem *et al.*, 2017). Perceived preparedness was highly esteemed by participants and concluded to be the strongest distinguishing factor between the symptomatic and non/ low- symptomatic group for PTSD (Feder *et al.*, 2016; 77). While risk factors have been found to vary by occupation, one commonality which has been associated with PTSD in professional responders was the performing of work for which responders were

not trained (e.g. firefighting among police officers). Notably, studies on WTC responders found that education and preparedness training were found to be protective of rescue workers within the context of post-disaster response (Feder *et al.*, 2016; Pietrzak *et al.*, 2013; Wenji *et al.*, 2016). These findings were comparable to those of Pietrzak *et al.* (2013). They furthermore suggested that the higher level of training received by police responders better prepared them for trauma response compared to non-traditional responders, making them less-likely to have clinically elevated patterns of exposure-related PTSD.

This review identified several interventions for promoting mental health and wellness, which have had varying levels of success amongst the relevant study cohorts. Despite their stressful lifestyles, rescue workers were found to thrive the best when surrounded by options for stress management in a supportive and caring work culture (Swab, 2020). Notwithstanding, participants across these studies indicated that they lacked the relevant disaster knowledge and skills prior to deployment on their mission, reiterating a need for the integration of more comprehensive disaster response training within formative training curricula as well as consultation with deployment veterans in future disaster preparedness endeavours (Urrabazo, 2012; Wenji *et al.*, 2015). Access to stress management resources and programs was unsatisfactory because of a perceived lack of managerial investment in these initiatives.

Evidently, active leadership participation was perceived as critical to the success of any novel initiatives implemented to promote rescue workers' mental health and wellness in light of their propensity for developing work-related mental health illnesses (Swab *et al.*, 2020). For instance, many study participants indicated that they engaged in hobbies such as sports, music, exercise and religious activities to manage their stress; an area of intervention recommended was exploring options to promote these pass-times through reduced membership fees to recreational fitness facilities. Garner *et al.* (2016) suggest that programs which trained first responders in emergency management, stood to benefit from integrating studies on the therapeutic benefits of mindfulness and social integration into their curriculums.

Social integration enabled respondents to cope better with adversity, creating a buffering effect against severe stress response in police responders (Feder *et al.*, 2016; Garner *et al.*, 2016; Pietrzak *et al.*, 2013; Schenk *et al.*, 2017; Schwarzer *et al.*, 2013). This is substantiated by the findings by Schwarzer *et al.* (2013) that the experience of traumatic events in the absence of social support resulted in the highest stress level. Occupational stress has been shown to be

robustly associated with inadequate or insufficient sleep, a finding which underscores its clinical importance (Smith *et al.*, 2018). Swab et al. (2020) suggest that interventions are necessary to manage occupational exhaustion among rescue workers when considering the haphazard routine inherent in rescue work and the reality of extended shifts. Notably, Kim *et al.* (2019) suggest that negative trajectories of PTSD may be arrested if occupational exhaustion is controlled for. It has been suggested that service administrators investigate alternatives in work schedules, possibly mitigating the taxing impact of long shifts beyond 16 hours, such as policies that permit sleep while on duty, should it be deemed beneficial. Furthermore, discussions regarding the value of sleep in high-stress occupations, as well as associations between substance use on sleep disturbance and the untenable relationship between sleep disturbance and stress tolerance, have been suggested (Smith *et al.*, 2018).

Factors particular to individual rescue workers, such as personality traits and coping mechanisms, can have some bearing on the propensity to develop PTSD and are worth considering prior to deployment. Notably, Kamarovskaya *et al.* (2014) illustrated a potentially lasting impact of early physical abuse on the psychosocial health of police and fire personnel responding to mass disasters. Despite a lack of substantive evidence on the merits of mental health screening based on past psychological history or early symptomology, there may be some benefit in screening for resilience and higher adaptive qualities amongst these workers (Joyce *et al.*, 2019; 285). High-risk workers may be identified in this way and benefit from appropriate support, task delegation and possibly a shorter length of deployment, in which case they may still give of themselves and contribute to rescue efforts but avoid unnecessary expenditure (Schenk *et al.*, 2017). Crucially, focusing on factors which enhance adaptive resilience among first responders, such as cognitive-behavioural and mindfulness-based resilience training programs, may improve their ability to manage the potentially traumatic events that remain an unpredictable yet inherent aspect of their work (Joyce *et al.*, 2019). Notably, a randomised control trial on emergency tele-communicators found that tailor-made online mindfulness-based intervention (MBI) led to a potential in mindfulness and reduced reported stress (Lilly *et al.*, 2019).

The rich narrative yielded from the in-depth interviews conducted on rescue workers by Wenji *et al.* (2015) reiterates the hazardous nature of front-line disaster-response work and highlights the need for nurse responders to be healthy, fit and able to adapt, stressing that this be considered during the allocation of rescue personnel to such missions. Cognitive performance

and, to some measure, physical strength and stamina are affected by active drinks in a mixed method study in firefighters, suggesting that a glucose beverage may enhance these faculties during high-stake situations (Sünram-Lea *et al.*, 2012). Based on the results of this study, in situations of both physical and psychological stress common to rescue work, glucose- and caffeine-containing energy drinks may be an inexpensive and accessible resource which could be used to ameliorate some of the negative effects of stress. Focusing on factors which enhance adaptive resilience among first responders, such as cognitive-behavioural and mindfulness-based resilience training programs, may improve their ability to manage the potentially traumatic events that remain an unpredictable yet inherent aspect of their work (Joyce *et al.*, 2019).

Psychological debriefing allows the participant to talk about their experiences and is one of the most commonly used treatments for psychological dysfunction (Urrabazo, 2012; 162). However, in the absence of compelling evidence for the efficacy of debriefing, psychological first aid has been recommended, which incorporates attendance to immediate practical and emotional needs as disclosed by the participant, as well as the provision of resources to assist and inform them (Chongruksa *et al.*, 2012). Finally, withing the context of WTC responders, the existence of a mental health impact, as long as 12 years after the exposure, underscored the chronic impact rescue work could have on emergency responders (Pietrzak *et al.*, 2013; Jordan *et al.*, 2019). This has prompted the authors to suggest that some benefit may be realised in long-term monitoring of responders in the form of outreaches to inform exposed people of the availability of health resources or to monitor the trajectory of mental health symptomology for a referral.

5.3 IMPLICATIONS FOR PRACTICE AND FURTHER RESEARCH

5.3.1 Implications for Practice

The findings of this review encapsulate something of the challenging work environment of rescue workers and the substantial demands on their mental health. Though there are beneficial evidence-based interventions for managing psychological distress, more proactive and preventive interventions may benefit responders by bolstering their resilience before they require curative management. The following recommendations are made arising from the findings of the study.

Consider incorporating more focused disaster management training during formative training and as part of ongoing education and training. Perceived preparedness was highly esteemed by participants and found to be a strong distinguishing factor between the symptomatic and non/ low- symptomatic group for PTSD (Feder *et al.*, 2016; 77). Rescue workers with prior disaster-response experience gain valuable working knowledge and experience during deployment. These were highly esteemed by study respondents during this study, reiterating that there may be merit in consulting these professionals during rescue work training to garner valuable insight and knowledge.

A greater emphasis on stress management training through more active promotion of available employee resources and supervisory support. A passive approach to stress management training, professional development and resource planning from management emerged across reviewed studies as an area needing improvement (Garner *et al.*, 2016; Swab, 2020; Urrabazo, 2012; Wenji, 2015). Despite their stressful lifestyles, rescue workers were found to thrive the best when surrounded by options for stress management in a supportive and caring work culture (Swab, 2020). Focusing on factors which enhance adaptive resilience among first responders, such as cognitive-behavioural and mindfulness-based resilience training programs, may improve their ability to manage the potentially traumatic events that remain an unpredictable yet inherent aspect of their work (Joyce *et al.*, 2019; 289).

A reanalysis of rescue workers' occupational conditions explicitly concerns the negative impact of extended shift work inherent within this occupation. Prolonged shift work has been closely related to maladaptive coping mechanisms such as isolation and substance abuse, both of which negatively affected the client and family of the rescue worker. Negative symptom trajectories in PTSD may be reduced when occupational exhaustion is avoided, and investigating the possibility of allowing for sleep intervals across shifts extending beyond 16 hours should be considered (Kim *et al., 2019*).

Fostering social integration as a resource for stress management amongst rescue workers has been found to enable respondents to cope better with adversity, creating a buffering effect against severe stress response in police responders (Feder *et al.*, 2016; Garner *et al.*, 2016; Pietrzak *et al.*, 2013; Schenk *et al.*, 2017; Schwarzer *et al.*, 2013). Notably, those who regularly engaged in hobbies such as sports, music, exercise and religious activities were better able to manage their stress (Swab, 2020; 170). Enhancing these activities through opportunities such

as reduced membership fees to exercise and recreational facilities could be administrative considerations for their employers.

PTSD symptom trajectories may not be clear-cut and compounded by comorbid psychological and physical injuries sustained during deployment. Feder *et al.* (2016) acknowledge that medical conditions arising out of disaster response work not only maintained but potentially worsened PTSD symptom severity because they served as reminders of the exposure impact over time. PTDS symptoms and the associated impaired quality of life have been detected long after exposure, which suggests that outreach programs to affected populations should be considered to monitor respondent wellbeing and provide a necessary referral for appropriate interventions or care. In conclusion, the existence of a mental health impact amongst rescue workers underscores the value of preventative, curative and rehabilitative efforts to improve their quality of life.

5.3.2 Implications for Further Research

The literature search process for this review revealed a large body of knowledge related to rescue workers' mental health, with studies done internationally attesting to the global relevance of the topic. While it could be said that rescue workers' mental health is well documented across various languages, cultures and study methodologies, disagreement exists on fundamental issues, and findings remain inconclusive. With the continual emergence of evidence-based data, this field of study remains evolving. Integrative reviews contribute to the field of academic literature and data through the synthesis of new knowledge, and they also identify knowledge gaps which can direct future scientific enquiry. Based on the findings of this study, the following recommendations for future research were identified:

While disasters strike with devastating effects bringing suffering to their victims and challenges to teams of rescue workers, this may look different across differing cultures, climates and continents. Throughout this review, no studies were retrieved that documented local disaster response efforts with their unique challenges and effects. Evaluating disaster response within a local context may have been more beneficial and relatable.

Throughout this review, a reoccurring theme within the finding of included studies was the need for more longitudinal studies to follow better the trajectories of exposure to rescue work and the impact, positive or negative, of mental health interventions implemented within the

studies. There may be some merit in revisiting the cross-sectional study cohorts to track the trajectories of mental health interventions such as mindfulness training.

Another reoccurring theme throughout this review was the need for more proactive promotion of resources available to rescue workers through managerial participation in such initiatives. While this recommendation was made across a number of the included studies, none went so far as to evaluate the efficacy of such an initiative or the uptake of the same by rescue workers. Such a study could potentially validate or relegate this intervention from future consideration in the promotion of the mental health and wellness of this cohort.

The negative impact that rescue work potentially carries is widely accepted. Paradoxically, a reoccurring limitation across studies was the significant level of attrition from intervention groups. It may be beneficial to establish how rescue workers assess the impact of their occupational stress and challenges on their mental health and wellness through a study. This may serve as foundational to future interventions that can be tailored to avoid the deleterious effects of attrition from potentially beneficial training.

5.4 STRENGTHS AND LIMITATIONS

5.4.1 Strengths of the Study

Included literature boasts an international and pan-continental representation, with studies spanning four (4) continents, including North America, Europe, Asia and Australasia, indicating that the issue of rescue workers' mental wellbeing is a widely recognized concern. The literature comprised published works (qualitative, quantitative and mixed-method) and unpublished, grey-literature works (qualitative and mixed-method). In order to ensure the broadest possible search of relevant literature, the services of an experienced librarian were employed, which assisted in identifying indexed terms and appropriate search strings to acquire more accurate returns on database searches. Because of the similarity and synonymity of certain search words, search terms were used interchangeably under the librarian's instruction because certain databases suggested indexed words with similar meanings. These terms included: "mental health"; "psychological health"; "mental wellbeing"; "sudden onset disaster"; "terrorism"; "natural disaster"; "rescue worker" and "first responder." A systematic approach outlined by Whittemore and Knafl (2005) was used, which made the reviewer's

analysis and presentation stages transparent. The clinical experience of the research supervisor, who had co-authored other studies, was valuable in checking the validity of the methods and results and in determining their usefulness in practice (Souza *et al.*, 2010; 104)

5.4.2 Limitations of the Study

All methodological limitations of an integrative review must be explicitly stated for transparency and as evidence of scientific rigors employed to decrease bias (Whittemore and Knafl, 2005; Souza *et al.*, 2010). Limitations encountered during this study are discussed below.

- **Participants**

Most of the individual study participants were male, portraying a larger male representation amongst this group of studied professionals during this review; however, it may have been valuable to gain more insight from the perspective of female rescue workers who undoubtedly exist within this group of workers. Individual study cohorts also covered broad experience levels, from students in formative training to experienced rescue worker veterans across different speciality disciplines, from nurses to firefighters and police officers.

- **Time**

Studies included in this review were limited to those published and unpublished within a ten-year period from January 2010 to December 2019. Literature falling outside of this period may have influenced findings. Notably, literature after this period may have revealed more incumbent findings following the advent of the coronavirus (COVID-19) pandemic. The review period encompassed the most current literature when the study commenced.

- **Scope of the database**

The literature search for this study was conducted across the SCOPUS, PsychINFO, ProQuest Nursing and Allied Health Database, EBSCOhost (Academic Search Complete, CINAHL, Psychology and Behavioural Sciences Collection) databases, as well as a hand search journal

of The World Health Organization. The databases for this review were selected on the merit and likelihood of housing literature relevant to this study's topic. Notwithstanding, studies published in other databases may have influenced the findings presented in this study.

- **Language**

Due to the researcher's language proficiency, only English literature was included in this study. Due to the global relevance of the topic, many studies may likely have been excluded based on these exclusion criteria, which may have impacted the findings presented.

5.5 CONCLUSION

This study reviewed the body of literature to identify factors that promote rescue workers' mental health. This group of professionals is indispensable and integral to the success of an ever-growing number of international disaster relief efforts. Rescue workers find intrinsic value in their work and act out of a sense of duty, professional pride, and a willingness to serve and alleviate the suffering of others. Despite this commendable office, rescue work can be demanding and presents unique and unprecedented challenges to rescue workers. A more proactive managerial involvement in the resourcing, training and support of rescue workers, as well as a review of policies surrounding the occupational conditions such as length of shifts, the fostering of family and community support and integration and the provision for leisure activities for their therapeutic benefit, were factors which stood to improve the mental health outcomes of rescue workers potentially.

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APPENDIX A

Critical Appraisal Tool for Qualitative Studies - Critical Appraisal Skills Programme (CASP, 2018)

	Yes	Can't tell	No
1. Was there a clear statement of the aims of the research?	☐	☐	☐
2. Is a qualitative methodology appropriate?	☐	☐	☐
3. Was the research design appropriate to address the aims of the research?	☐	☐	☐
4. Was the recruitment strategy appropriate to the aims of the research?	☐	☐	☐
5. Was the data collected in a way that addressed the research issue?	☐	☐	☐
6. Has the relationship between the researcher and participants been adequately considered?	☐	☐	☐
7. Have ethical issues been taken into consideration?	☐	☐	☐
8. Was the data analysis sufficiently rigorous?	☐	☐	☐
9. Is there a clear statement of findings?	☐	☐	☐
10. How valuable is the research?	☐	☐	☐

Note. Reproduced from The Critical Appraisal Skills Programme for use in Critical Appraisal of Qualitative

Studies, Checklist for Qualitative Research (Critical Appraisal Skills Programme (CASP, 2018)

APPENDIX B

Permission to use Data Collection Tool

https://casp-uk.net/referencing/

creative commons license.

Creative Commons

In relation to the CASP checklists, we have a Creative Commons license for these, so as long as they are being used for non-commercial reasons, and are attributed then we are very happy for you to use them. If in doubt, contact us and we will let you know.

We are usually very happy for them to be shared!

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APPENDIX C

MIXED METHOD APPRAISAL TOOL (MMAT-VERSION 2011)

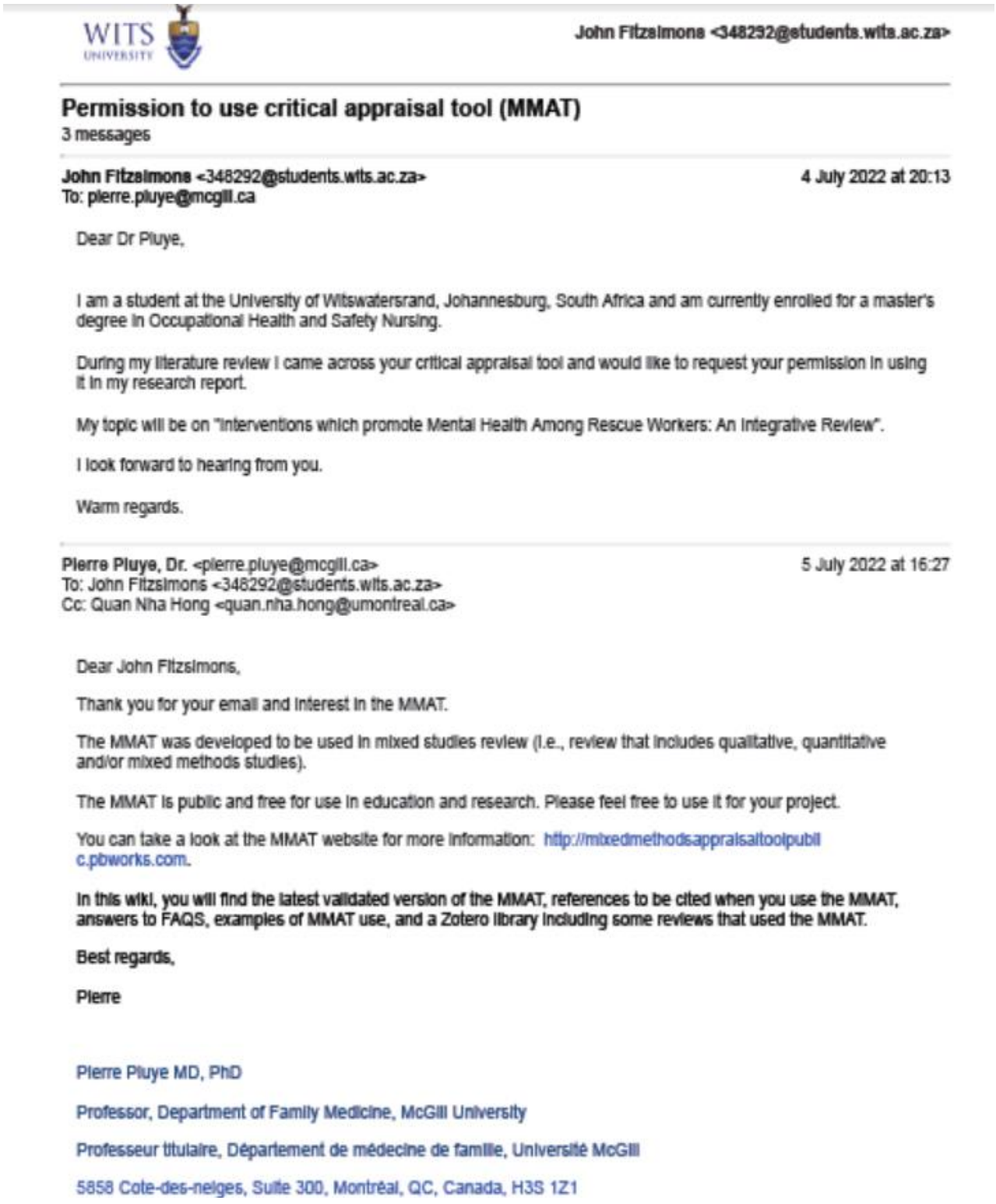
Types of mixed methods study components or	Methodological quality criteria (see tutorial for definitions and examples)	Responses			
		Yes	No	Can't tell	Comments
Screening questions (for all types)	Are there clear qualitative and quantitative research questions (or				
	Do the collected data allow address the research question (objective)? E.g., consider whether the follow-up period is long enough for the				
	Further appraisal may be not feasible or appropriate when the answer is 'No' or 'Can't tell'				
1. Qualitative	1.1. Are the sources of qualitative data (archives, documents, informants, observations) relevant to address the research question				
	1.2. Is the process for analyzing qualitative data relevant to address the				
	1.3. Is appropriate consideration given to how findings relate to the context,				
	1.4. Is appropriate consideration given to how findings relate to researchers' influence, e.g., through their interactions with participants?				
2. Quantitative randomized controlled (trials)	2.1. Is there a clear description of the randomization (or an appropriate				
	2.2. Is there a clear description of the allocation concealment (or blinding				
	2.3. Are there complete outcome data (80% or above)?				
	2.4. Is there low withdrawal/drop-out (below 20%)?				
3. Quantitative non- randomized	3.1. Are participants (organizations) recruited in a way that minimizes				
	3.2. Are measurements appropriate (clear origin, or validity known, or standard instrument; and absence of contamination between groups				
	3.3. In the groups being compared (exposed vs. non-exposed; with intervention vs. without; cases vs. controls), are the participants				
	3.4. Are there complete outcome data (80% or above), and, when applicable, an acceptable response rate (60% or above), or an acceptable				
4. Quantitative descriptive	4.1. Is the sampling strategy relevant to address the quantitative research				
	4.2. Is the sample representative of the population understudy?				
	4.3. Are measurements appropriate (clear origin, or validity known, or				
	4.4. Is there an acceptable response rate (60% or above)?				

5. Mixed methods	5.1. Is the mixed methods research design relevant to address the qualitative and quantitative research questions (or objectives),				
	5.2. Is the integration of qualitative and quantitative data (or results*) relevant				
	5.3. Is appropriate consideration given to the limitations associated with this integration, e.g., the divergence of qualitative and quantitative				
	Criteria for the qualitative component (1.1 to 1.4), and appropriate criteria for the quantitative component				

Scoring metrics: For each retained study, an overall quality score may be not informative (in comparison to a descriptive summary using MMAT criteria), but might be calculated using the MMAT. Since there are only a few criteria for each domain, the score can be presented using descriptors such as *, **, ***, and ****. For qualitative and quantitative studies, this score can be the number of criteria met divided by four (scores varying from 25% (*) -one criterion met- to 100% (****) -all criteria met-). For mixed methods research studies, the premise is that the overall quality of a combination cannot exceed the quality of its weakest component. Thus, the overall quality score is the lowest score of the study components. The score is 25% (*) when *QUAL=1 or QUAN=1 or MM=0*; it is 50% (**) when *QUAL=2 or QUAN=2 or MM=1*; it is 75% (***) when *QUAL=3 or QUAN=3 or MM=2*; and it is 100% (****) when *QUAL=4 and QUAN=4 and MM=3* (QUAL being the score of the qualitative component; QUAN the score of the quantitative component; and MM the score of the mixed methods component; QUAN the score of the quantitative component; and MM the score of the mixed methods component).

APPENDIX D

Permission to use Critical Appraisal Tool (MMAT)



WITS UNIVERSITY

John Fitzsimons <348292@students.wits.ac.za>

Permission to use critical appraisal tool (MMAT)

3 messages

John Fitzsimons <348292@students.wits.ac.za> 4 July 2022 at 20:13
To: pierre.pluye@mcgill.ca

Dear Dr Pluye,

I am a student at the University of Witswatersrand, Johannesburg, South Africa and am currently enrolled for a master's degree in Occupational Health and Safety Nursing.

During my literature review I came across your critical appraisal tool and would like to request your permission in using it in my research report.

My topic will be on "Interventions which promote Mental Health Among Rescue Workers: An Integrative Review".

I look forward to hearing from you.

Warm regards.

Pierre Pluye, Dr. <pierre.pluye@mcgill.ca> 5 July 2022 at 16:27
To: John Fitzsimons <348292@students.wits.ac.za>
Cc: Quan Nha Hong <quan.nha.hong@umontreal.ca>

Dear John Fitzsimons,

Thank you for your email and interest in the MMAT.

The MMAT was developed to be used in mixed studies review (i.e., review that includes qualitative, quantitative and/or mixed methods studies).

The MMAT is public and free for use in education and research. Please feel free to use it for your project.

You can take a look at the MMAT website for more information: http://mixedmethodsappraisaltoolpublic.pbworks.com.

In this wiki, you will find the latest validated version of the MMAT, references to be cited when you use the MMAT, answers to FAQS, examples of MMAT use, and a Zotero library including some reviews that used the MMAT.

Best regards,

Pierre

Pierre Pluye MD, PhD

Professor, Department of Family Medicine, McGill University

Professeur titulaire, Département de médecine de famille, Université McGill

5858 Cote-des-neiges, Suite 300, Montréal, QC, Canada, H3S 1Z1

APPENDIX E

DE SOUZA, DA SILVA and DE CARVALHO (2010) DATA EXTRACTION TOOL

DATA EXTRACTION TOOL	
Author (s)	
Year of publication	
Country	
Title of publication	
Type of publication	
Aim/objective	
Population/sample	
Data collection	
Data analysis	
Results/findings	
Implications/Recommendations	
Limitations	

APPENDIX F

Ethical Clearance from Human Research Ethics Committee (Medical), University of the Witwatersrand

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

Office of the Deputy Vice-Chancellor (Research & Post Graduate Affairs)

23/04/2021

Ref: W-CBP-210423-01

TO WHOM IT MAY CONCERN

Waiver: This certifies that the following research does not require clearance from the Human Research Ethics Committee (Medical)

Investigator: Mr J Fitzsimmons
Student No. (if appropriate): 348292
Staff No. (if appropriate):

Supervisor: Ms A Huiskamp

School: Therapeutic Sciences
Department: Nursing Education
Medical School
University

Project title: *Interventions which promote mental health amongst rescue workers: an integrative literature review*

Reason: Review of information in the public domain
No human participants will be involved in the study

Dr CB Penny
Chairperson: Human Research Ethics Committee (Medical)

Research Office Secretariat:
Third Floor, Phillip Tobias Building, corner of St Andrews and York Roads, Parktown, Johannesburg 2193
Postal address: Private Bag 3, Wits 2050
Tel Nos: +27 (0)11 717 1234/1252/2656/2700
Office E-mail: HREC-Medical.ResearchOffice@wits.ac.za
Website:
https://www.wits.ac.za/research/researcher-support/research-ethics/ethics-committees/

APPENDIX G

POSTGRADUATE APPROVAL OF TITLE

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Private Bag 3 Wits, 2050
Fax: 027117172119
Tel: 02711 7172076

Reference: Mrs Sandra Benn
E-mail: sandra.benn@wits.ac.za

18 October 2022
Person No: 348292
PAG

Mr JM Fitzsimons
55 Fairview
Sanlam Road
Lynnwood Manor
0081
South Africa

Dear Mr John Fitzsimons

Master of Science in Nursing: Approval of Title

We have pleasure in advising that your proposal entitled *Interventions which promote mental health among rescue workers: An integrative literature review* has been approved. Please note that any amendments to this title have to be endorsed by the Faculty's higher degrees committee and formally approved.

Yours sincerely

Mrs Sandra Benn
Faculty Registrar
Faculty of Health Sciences