The Impact of Cumulative Trauma and Self-Regulation on Posttraumatic Stress Symptoms, Depression, and Suicidal Ideation in a Sample of New Zealand Firefighters

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To my husband:

You are the best thing that ever happened to me,

I could not have done this without you.

This is for you, the strongest person I know.

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II. Personal Disclosure

I am currently a serving member of Fire and Emergency New Zealand (FENZ), in the rank of volunteer Qualified Fire Fighter. I signed up to FENZ in 2018, attending a course to become a Fire Fighter in 2019, and a second course to be promoted to the rank of Qualified Fire Fighter in 2021. The operational and organisational experiences of my colleagues and myself were the motivation and inspiration for this research. I am disclosing this information to acknowledge my awareness that biases may have arisen from these personal experiences that could have influenced this work.

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VI. Abstract

This thesis presents a research study that aimed to explore the levels of psychological distress in a sample of New Zealand (NZ) firefighters. While there is a growing body of literature that recognizes the importance of first responders' psychological distress, there is still a paucity of research, especially on firefighters and in particular firefighters in NZ. A thorough search of literature did not reveal any quantitative research on NZ firefighters and factors contributing to and alleviating psychological distress. This study aimed to build on previous international findings and examine the presence of posttraumatic stress symptoms (PTSS), depression, and suicidal ideation (SI) in a sample of NZ firefighters, as well as investigate the impact of potentially traumatic events (PTEs) and self-regulation on this presence.

First, a scoping review was undertaken of the existing evidence of the precursors to SI in firefighters. A questionnaire was developed incorporating these factors. Then, data was collected from 220 NZ firefighters through an online survey. As predicted, PTSS, depression, and SI were found to be significantly higher in NZ firefighters than in the general population. While career firefighters were found to be exposed to significantly higher cumulative trauma exposure than volunteer firefighters, no significant differences were found in the levels of psychological distress between the two groups. PTSS and depression showed a significantly positive relationship with SI. Multiple significant positive correlations were found between psychological distress and demographic and occupational characteristics. Lastly, better self-regulation skills were found to be associated with less psychological distress and moderated the relationship between cumulative trauma exposure and psychological distress.

VII. Abbreviations

In alphabetical order:

BSCS	Brief Self-Control Scale
CBT	Cognitive behavioural therapy
FENZ	Fire and Emergency New Zealand
IPTS	Interpersonal-psychological theory of suicidal behaviour
LEC-5	Life Events Checklist for DSM-5
MDD	Major depressive disorder
NSSI	Nonsuicidal self-injury
NZPFU	New Zealand professional firefighters' union
PCL-5	PTSD Checklist for DSM-5
PHQ-9	Patient Health Questionnaire-9
PTE	Potentially traumatic experience
PTSS	Posttraumatic stress symptoms
SA	Suicide attempt
SB	Suicidal behaviour
SI	Suicidal ideation
SITBI-SF	Self-Injurious Thoughts and Behaviours Interview-Short Form
UFBA	United fire brigade association

CHAPTER 1: Introduction

This research developed from personal experience and a commitment to firefighting, which led to an awareness of the stressors involved, especially as a result of a series of events that occurred in Australia and New Zealand in the summer of 2019/2020. In this chapter, the development of this thesis topic will be discussed, followed by the overall rationale and argument for the research. The final aspect of this chapter will describe the structure and organisation of this thesis.

1.1. Thesis Development

In the summer of 2019/2020, a series of traumatic events occurred all involving firefighters. It was a season of the notorious bushfires that raged across Australia taking 28 lives, including several volunteer firefighters. As of 1 January 2020, more than 3000 homes had been destroyed in the state New South Wales alone (Yeung, 2020). More than 7.3 million hectares were burned across Australia. During this same period in NZ first responders attended many traumatic events. For example, over the course of just one weekend in the Wairarapa region, five people lost their lives in various incidents. On Friday 10 January 2020, a father and his 10-year old son were lost at sea while diving for pāua (Taylor & Dillane, 2020). After an extensive two-day search, the bodies were found. On the Monday morning, two people died in a firearms incident (RNZ, 2020). Later the same morning, a car and truck collided (NZ Herald, 2020). The driver of the car died instantly. A firefighter in the first responding truck, discovered it was his mother and brother in the car. Certain local first responders attended all three of these incidents within the one weekend, highlighting how traumatic events can accumulate for first responders. The current thesis topic was informed by these events, combined with the author's personal experience as a firefighter. Further, in 2014, Fire and Emergency New Zealand (FENZ) reached an agreement with the ambulance

services St. Johns New Zealand and Wellington Free Ambulance, to attend all life-threatening, cardiac, or respiratory arrest emergencies, which are known as ‘purple calls’ (Adams et al., 2018). This agreement was made to ensure a faster and more effective response to these calls.

While FENZ has always had fire calls as its primary focus, FENZ personnel had also attended car accidents, animal rescues, and storm damage. Purple calls tend to have limited success, and a high death rate, therefore the addition of purple calls has led to firefighters experiencing an increase in exposure to fatal and potentially fatal calls, including suicides, homicide, and (paediatric) cardiac arrests (Adams et al., 2018). Posttraumatic reactions can develop after exposure to a single traumatic event (APA, 2013). Studies have shown a correlation between exposure to fatalities and increased risk of mental health injuries (Harvey et al., 2016). This study found a positive linear relationship between the attendance of fatal incidents and the rates of posttraumatic stress disorder and depression. Other studies have found that firefighters responding to suicide attempts were more likely to experience suicidal ideation (SI; Stanley et al., 2015) and firefighters unable to resuscitate a child may develop lower coping ability (Sattler et al., 2014). Accordingly, the impact of purple calls, which are viewed as potentially traumatic events (PTEs), on the mental health of NZ firefighters should be considered. A PTE refers to an event where an individual is exposed to actual or threatened death, severe injury, or sexual violence, in line with Criterion A for a traumatic response in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (APA, 2013).

At the time of writing, there is no published literature on the presence, rates, and severity of psychological distress in firefighters in NZ. Using a firefighters’ scholarship, senior firefighter Darby wrote a report for FENZ on his investigation of psychological distress,

injury, and suicide within FENZ in 2019 (Darby, 2019). In this report, Darby called for more research to be undertaken to start building a picture of national data to understand the extent of psychological distress and injuries within FENZ to aid in building the appropriate number of resources to develop and implement strategies to alleviate distress. This study aims to answer this identified gap in the research to increase the understanding of the presence of psychological distress in NZ firefighters.

1.1.1. Research Question and Aims

The overall aim of this research is to examine how PTEs lead to PTSS, depression, and SI in a sample of NZ firefighters as well as investigate how self-regulation skills moderate this relationship. For the purposes of this thesis, PTSS, depression, and SI are referred to as psychological distress or psychological injuries. The research question used to examine this is: What is the level of posttraumatic stress symptoms, depression and suicidal ideation in NZ firefighters and what factors play a role in the development and improvement of these psychological injuries? The aims of this project were: 1) to investigate cumulative trauma exposure and psychological distress in a sample of NZ firefighters, 2) to investigate the relationship between PTEs and psychological distress in a sample of firefighters, and 3) to investigate whether self-regulation skills are associated with less psychological distress in a sample of NZ firefighters, and whether self-regulation skills weaken the relationship between PTEs and psychological distress.

1.1.2. Posttraumatic Stress Symptoms

Research has shown that posttraumatic stress symptoms (PTSS), depression, and SI is more prevalent in firefighters than in the general population (Wagner & O'Neill, 2012). Although the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; APA, 2013) uses the term posttraumatic stress disorder (PTSD) as opposed to

PTSS, discussion has emerged in literature regarding the use of PTSD and its accompanying stigma and barriers (Keynan & Keynan, 2016). As a result, there has been a growing shift away from the use of the term PTSD to diminish the stigma associated with psychological injuries. For the purposes of this thesis, the term PTSS will be used, including when reviewing literature where the term PTSD has been used.

Scientific investigations of PTSS in firefighters has reported a rate of PTSS ranging from 6.5% (Haslam & Mallon, 2003) to 57% (Alghamdi et al., 2015). It has been suggested that this is a highly elevated risk for PTSS, since the estimated one-year rate in the general population is 3.6% (Wagner & O'Neill, 2012). Furthermore, the clinical rates of depression in firefighters have been reported to range between 11% (Carey et al., 2011) to 21% (Saijo et al., 2008). There has not yet been any specific literature on PTSS, depression, and SI in NZ firefighters. Studies within NZ examining PTSS, depression, and SI have only been carried out on first responders as a whole population or other first responder samples, such as police (de Terte et al., 2014; Surgenor et al., 2015). While two reports considered the impact of attending traumatic calls on the mental health of firefighters, and actions were developed for FENZ to support firefighters' wellbeing (Adams et al., 2018; Darby, 2019), PTSS, depression, and SI in NZ firefighters has not yet been empirically investigated. Furthermore, examining factors that are protective for firefighters' psychological wellbeing is important in order to alleviate the impact of PTE calls on firefighters.

One such protective factor is self-regulation. Self-regulation signifies the individual's self being able to override responses with a less automatic, but more appropriate response (Baumann et al., 2005). Differences in self-regulation skills have been examined in various populations. Tangney et al. (2004) found that individuals with higher self-regulation functioned overall more effectively, had better relationships, less conflict, higher empathy

and showed better psychological adjustment and fewer psychological problems than individuals with lower self-regulation. Another study found that stressful life events, such as PTEs, were particularly damaging to individuals' wellbeing when self-regulation skills and coping abilities were low (Baumann et al., 2005). Conversely, this outcome shows that when self-regulation skills are high, PTEs are less likely to have a damaging impact on one's psychological wellbeing. Therefore, understanding the role of self-regulation skills in the development of PTSS, depression, and SI in firefighters will help inform interventions that can target the increase of self-regulation skills to alleviate the impact of PTEs on firefighters' psychological wellbeing.

1.2. Structure and Organisation of the Thesis

This thesis has been written by publication and contains two manuscripts that have been prepared for submission to academic journals. There is some unavoidable repetition between chapters to ensure that the manuscript chapters are complete when read in isolation, including some words that will be abbreviated in the thesis and again in the manuscripts. To maintain a coherent flow, a single reference list is provided at the back of this thesis, rather than accompanying each manuscript. Chapter 2 of this thesis will present a review of the literature on first responders and their work, along with an overview of literature on PTSS, depression, and SI in general. Chapter 3 will present a review of literature looking more closely at PTSS, depression, and SI in first responders, and specifically in firefighters. Chapter 4 presents a manuscript containing a scoping review of evidence regarding the precursors to SI in firefighters. This will be followed by the research overview in Chapter 5 and the methodology in Chapter 6. Chapter 7 presents a second manuscript discussing the results of the study with a particular focus on a comparison between career and volunteer firefighters,

while Chapter 8 will present the general results. Finally, Chapter 9 will combine all threads together in a discussion of the results.

CHAPTER 2: PTSS, Depression, and Suicidal Ideation

This chapter is divided in two parts. The first part will provide a brief summary of literature on first responders and their work, in particular focusing on firefighters. The second part will be an overview of literature on PTSS, depression, and SI.

2.1. First Responders

First responders have been defined as a diverse group of voluntary and career personnel providing indispensable aid in emergencies, with the main focus on first response to such emergencies (Haugen et al., 2012). More broadly, first responders have been defined as those working in vocations that are requested to help in case of emergencies or accidents, where their tasks involve protection of people's lives, safety, or property (Arble & Arnetz, 2017). First responders generally receive focused training, including certification, to prepare and allow them to take appropriate steps to ensure the health and safety for victims, individually or on a larger public scale. Trainings vary depending on the profession and the country the first responders are in. There are a wide variety of PTEs that first responders are likely to be exposed to, such as fires, severe or fatal injuries, homicides, and suicidal behaviour (Corneil et al., 1999; Kleim & Westphal, 2011; Molnar et al., 2017).

Klimley et al. (2018) argued that first responders, while trying to ensure the community stays safe, at the same time have to deal with high work pressure as well as exposure to PTEs, both physically and psychologically. For example, fatality rates for firefighters are equivalent to police officers, with both professions three times more likely to die at work then other occupations (Klimley et al., 2018). However, firefighting is unique in that it involves both volunteers and professionals. In NZ, approximately 11,801 firefighters, or 87%, are volunteers (Fire and Emergency New Zealand, 2019).

The nature of firefighters' work, whether voluntarily or career, means they are routinely exposed to both physical (e.g., heavy personal equipment) and psychological stressors (e.g., exposure to events that put the firefighter's health or life at risk, such as backdrafts; Haugen et al., 2012). Changes in home and construction materials for example have led to an increasing risk of flashover, which is the concurrent ignition of flammable material in an enclosed area (Kerber, 2012). A further risk that differentiates first responders from the general public is being involved in rescue events to prevent death or serious injury (Carleton et al., 2019). For firefighters, the protection of people and property was originally focused on fire calls (Henderson et al., 2016). With education and prevention an increased focus, fire calls have declined, while fire departments have acquired new duties, such as vehicle extrication, hazardous material, and first aid calls.

Approximately 60% of American fire departments have been cross trained to provide medical services, which in turn has resulted in an increase of PTEs (Klimley et al., 2018). Since 2014, FENZ has entered an agreement with the ambulance services in NZ (Wellington Free Ambulance in the wider Wellington region and St John New Zealand in the rest of the country) to attend any calls that involve life-threatening emergencies, including cardiac, respiratory arrest, suicide attempts and completed suicides. These calls are known as purple calls. The added responsibility of these purple calls has seen firefighters upskilled to the first aid level of co-responders. Adams et al. (2018) suggested that in smaller communities, the reality often is that firefighters are the first to arrive and it can be 30 minutes or longer before they are joined by ambulance personnel or police.

The added responsibilities described above means first responders are now at a greater risk for mental health conditions, such as PTSS and depression (Henderson et al., 2016). It has been suggested that the accrual of traumatic experiences increases the probability of PTSS and suicidal ideation (Jones, 2017). This author conducted a systematic review of 27 articles

and found increased attendance of critical incidents or PTEs was significantly associated with PTSS in ambulance workers (van der Ploeg & Kleber, 2003) as well as career firefighters' higher exposure to PTEs was related to significantly higher rates of PTSS than in auxiliary firefighters (Dean et al., 2003). Before examining the risk factors to developing PTSS, the term PTSS will be defined, along with the rates, predictors, and theories of PTSS.

2.2. Posttraumatic Stress Symptoms (PTSS)

PTSD, an official diagnosis described in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; APA, 2013), is characterized by intrusion symptoms, avoidance behaviour, negative alterations in mood and cognitions as well as alterations in arousal and reactivity. As previously mentioned, the term PTSS will be used instead of PTSD. PTSS is defined as an exposure to actual or threatened death or serious injury resulting in the symptoms described above for more than 1 month (APA, 2013). If the diagnostic triad of intrusive memories, avoidance behaviours and heightened arousal have been present for more than a month and cause significant distress as well as impairment in functioning after being repeatedly exposed to traumatic events, a person may be diagnosed with PTSS.

In order to diagnose PTSS, Danckwerts and Leathem (2003) suggested that the symptoms must be differentiated from other disorders, such as obsessive-compulsive disorder (OCD). OCD symptoms include intrusive thoughts; however, these are not related to an experienced traumatic event, while the intrusive recollections that are most commonly reported in PTSS are reexperiences of the trauma, such as dreams, and dissociative flashbacks, and largely triggered automatically by cues related to the traumatic event. The following sections will discuss rates, predictors, and theories of PTSS.

2.2.1. Rate of PTSS

The rate of PTSS in the general population ranges between 6.8% and 7.8% (Kessler et al., 2005; Mendes et al., 2008), with one study (Gadermann et al., 2012) estimating the 12-month rate of PTSS to be 4%. Common precipitating events discussed in literature are sexual abuse, combat, natural disasters, and life-threatening accidents (Leahy et al., 2012; Schnurr et al., 2002; Stein et al., 2002).

2.2.2. Predictors of PTSS

There are several predictive factors for the development of PTSS in the general population. Some examples include direct exposure to the event, dissociation during the event, greater severity of event or initial reaction, limited social support after the event, longer duration of exposure and perceived threat of death (Schnurr et al., 2002). Further premorbid factors include, but are not limited to, a younger age at the time of the experience, low intelligence, and childhood adversity (Schnurr et al., 2002; Stein et al., 2002).

A genetic disposition accounts for approximately 30% of the risk of PTSS development (Leahy et al., 2012), but this disposition can be mediated by some of the above mentioned risk factors (Stein et al., 2002). PTSS is commonly comorbid with at least one other psychiatric disorder, most commonly, depression (estimated around 48% of people who experience PTSS), substance abuse (e.g., alcohol; approximately 51.9% male and 27.9% female) and anxiety disorders (55%; Dunner, 2001; Schoenfeld et al., 2004).

Pennington et al. (2018) examined the depressogenic effect of exposure to natural disasters, such as a hurricane, and found adult depression rates of 5% to 20% and PTSS rates of 4% to 14%. Similarly, Agyapong et al. (2019) examined the rate of likely PTSS six months after a mandatory evacuation for wildfires in Fort McMurray, Canada. They found

that one-month rate for likely PTSS was 12.8%, a considerable rise compared to the rate of 11.5% at the 2015 census. A mitigating factor was counselling after the wildfire, while exacerbating factors were a history of anxiety disorder prior to and limited or insufficient support after the disaster.

A meta-analysis of 68 studies found eight predictors of PTSS development (Ozer et al., 2003). A history of prior trauma increased the probability of developing PTSS after a PTE, and when the prior trauma involved interpersonal violence, such as rape or domestic violence, this increased the risk again. A third predictor of higher levels of PTSS symptoms was prior psychological adjustment problems, such as mental health treatment and pretrauma anxiety or emotional problems. The fourth predictor found in the meta-analysis was a history of mental health difficulties in the participants' family, such that participants with a family history of mental health difficulties were found to have higher rates of PTSS than those without a family history. This risk was again higher when the PTE involved interpersonal violence. Perceived life threat during the experienced trauma increased the likelihood of developing PTSS as well. A significant difference was also found between participants who experienced high levels of post-trauma social support and those who experienced less post-trauma social support, with social support being a protective factor. The final two factors leading to a higher risk of developing PTSS were peritraumatic emotional responses, particularly intense negative emotions such as helplessness and horror, and peritraumatic dissociation. Various theories have been developed to explore why some individuals are more likely to be sensitive to risk factors such as those described and go on to develop PTSS when other individuals do not.

2.2.3. Theories of PTSS

It has been suggested that individuals experiencing PTSS display an attentional bias towards threatening messages due to the increased stimuli of threat-related representations in the brain (Bryant & Harvey, 1995). Various models and theories have been developed as a framework for understanding PTSS. For the purposes of this thesis, Ehlers and Clark's (2000) cognitive model of PTSS will be discussed, as it is a seminal model for PTSS and linked to effective therapies for this concept of psychological distress. Ehlers and Clark's (2000) cognitive model of PTSS builds on Foa and Rothbaum's work. To understand this model, Foa and Rothbaum's work will be briefly explained, as well as the pivotal influence of appraisals on the development of PTSS. Foa and Rothbaum's (1998) emotional processing theory proposes that pretrauma beliefs influence the development of PTSS after experiencing a trauma, such that those people holding more rigid beliefs are at more risk of PTSS. Examples of rigid beliefs are believing the world is extremely safe. The second part of the theory involves negative appraisals of reactions or actions which influence and reinforce negative schema including feelings of inadequacy. Emotional processing theory has been pivotal to the development of theoretical as well as treatment plans (Kemmis et al., 2017).

In terms of the influence of appraisals on the development of PTSS, Brewin and Holmes (2003) point out that while some emotions develop instantly, other emotions develop after cognitive appraisals. The nature of PTEs is that there is a large variety in the length of time the victim has to appraise the event and the cause, culpability, and future implications of the event. Several authors have considered the role of appraisals on the development of PTSS (Arble & Arnetz, 2017; Armstrong et al., 2014; Bryant & Harvey, 1995). The variety of appraisals explains the variety of emotions individuals experiencing PTSS have conveyed. Ehlers and Clark's model builds upon these appraisals.

2.2.3.1. Ehlers and Clark's Cognitive Model.

Ehlers and Clark's (2000) model identifies multiple types of negative appraisals, such as overgeneralization of danger or negative life prospects. The variety of appraisals explains the variety of emotions individuals experiencing PTSS have conveyed. Ehlers and Clark described several factors that influence the risk of negative appraisals. The first factor, thought processes, such as mental defeat, which emphasizes the individual's powerlessness during the trauma, increases the risk of consequential negative self-appraisals such as being weak. Mental defeat is especially important in the case of firefighters, as a firefighter's image tends to be that of a hero (Kehl et al., 2014), which means experiencing mental defeat has an even bigger impact on firefighters. Another factor is prior experience of trauma or weakness, which increases an individual's risk of appraising themselves as being extremely vulnerable to danger.

The second important part of Ehlers and Clark's cognitive model of PTSS involves the quality of the process of mental encoding during the trauma, which impacts the nature of the memory. They make a distinction between data-driven processing, which pays attention to the sensory impressions, and conceptual processing, incorporating the meaning of the event as well as processing the information and its entire context. While conceptual processing allows for the memory to be fully integrated into autobiographical memory, data-driven processing leads to a disturbance in the memory of the event, making it inadequately detailed, with an incomplete context in time and place, and therefore inadequately incorporated into the individual's autobiographic memory. This disturbance leads to the inability to deliberately recall as well as the triggering by physically similar cues.

Both processes described above, negative appraisals and the nature of the memory, culminate into a sense of current threat, despite the trauma being in the past (Ehlers & Clark,

2000). This paradox of the trauma being in the past, yet individuals feeling an urgent sense of threat for the now and the future, what PTSS is renowned for. Ehlers and Clark (2000) further described the maladaptive behavioural strategies and cognitive processing styles that perpetuate the PTSS, such as avoidance of both trauma reminders and general activities as well as thought suppression. There is evidence that first responders are at increased risk of depression as well as PTSS (Henderson et al., 2016). It is therefore important to define depression and its symptoms.

2.3. Depression

The DSM-5 uses the term Major Depressive Disorder (MDD) and defines MDD as a mood disorder causing persistent feelings of sadness and loss of interest, interfering with daily functioning (APA, 2013). For the purposes of this thesis, the term depression will be used, including when reviewing literature where the term MDD has been used. To be diagnosed with depression, individuals must be experiencing a major depressive episode, which has two key symptoms: loss of pleasure or interest in most activities, and a depressed mood. Further symptoms may include insomnia or hypersomnia, feelings of guilt or worthlessness, significant weight gain or loss, psychomotor retardation or agitation, indecision, and recurrent thoughts of death or suicide. To be diagnosed with a major depressive episode, an individual must experience at least five of these symptoms, one of which must be depressed mood or loss of pleasure. The symptoms must have been experienced nearly every day for more than two weeks and cause significant distress as well as impairment in functioning.

Of importance with depression is the devastating nature of the disorder (Bennett et al., 2008). Recurrent depressive episodes have been suggested to have cumulative neurotoxic effects on the individual. Bennett et al. also pointed out that there are societal costs of

depression, such as costs of treatment; for example, mental health or medical professionals and medication; potential time off or loss of work, therefore less income; up until untimely end of life. There are varying rates of depression reported in literature.

2.3.1. Rates of Depression

Kessler et al. (2003) reported a lifetime rate in the general population of 16.2%., using the data of 9,090 United States (U.S.) respondents, aged 18 and over and a 12-month level of 6.6%. Gadermann et al. (2012) estimated the 12-month level of depression in the general population to be 9%, while Ferrari et al. (2013) reported an even lower global rate of 4.7%, calculated from 116 studies from around the world. Some gender differences have also been discussed. Leahy et al. (2012), for example, reported that females are twice more likely to be diagnosed with depression than males and more likely to attempt suicide, while males are more likely to use more lethal methods, resulting in higher completed attempts. Separation, divorce, and widowhood increase risk of depression, along with a family history of suicide, alcoholism, and depression.

Research has extensively examined factors that influence an individual's likelihood to develop depression. Factors increasing risk of developing depression were an age range of 18-59 (lifetime rate) or 16-44 (12-month), females (lifetime), homemakers (12-month), previously (lifetime) or never (12-month) married, poverty (12-month) (Kessler et al., 2003). Kessler et al. further found that non-Hispanic blacks and retired people portrayed significantly lower depression rates for lifetime, and Northeast and Midwest individuals were less likely to be clinically severe than other regions. Finally, a large proportion of individuals with depression had a comorbid diagnosis, namely 72.1% of lifetime and 78.5% of 12-month, with depression seldom the primary diagnosis.

Furthermore, genetics are estimated to account for between 37 and 66 % (Leahy et al., 2012), and is suggested to interact with socialization, such that individuals with a higher genetic risk appear to be more likely to become depressed after experiencing adverse childhood experiences. For example, parental divorce, separation, or death increases one's chances of developing depression.

Te Rau Hinengaro: The New Zealand Mental Health Survey of 2003-2004 found that 5.7% of New Zealanders had a 12-month rate of depression, which made it the second most common mental health disorder (specific phobia was the first with 7.3%), and depression was the most common single disorder of lifetime rate with 16% (Oakley-Browne et al., 2006). Their results confirmed that for New Zealanders, females tend to have higher depression rate than males. The 16 to 24-year-old age group had the highest 12-month rate (8.7%). Less than 10% of cases were classified as mild, 55.9% as moderate and 34.7% as severe.

Scott et al. (2010) maintain that the results of Te Rau Hinengaro provide further evidence that depression is not over-diagnosed and over-treated, as is argued in recent criticism and concerns that the thresholds for diagnosis are too low (Narrow et al., 2002; Regier et al., 1998). The concern that community surveys enclose too many mild cases was also disputed, as Te Rau Hinengaro results shown below 10% of the cases were classified as mild. Numerous models and theoretical frameworks have been developed to understand depression.

2.3.2. Theories of Depression

The most prominent theory of depression will be discussed; the generic cognitive model (Beck & Haigh, 2014a), which contains several important additions to Beck's original cognitive theory of depression. Again, this theory was chosen due to being seminal in the field and being linked to effective therapies used for this concept of psychological distress. The generic cognitive model was developed as a theoretical representation of the underlying

cognitive processes in the development of depression and can be used by practitioners to develop hypotheses for clinical work. It integrates four parts that interact; situation, biased beliefs, focus and maladaptive behaviour.

Beck and Haigh (2014b) suggested that the difference between developing maladaptive and adaptive behaviour depends on the overemphasis of biases in normal information processing. While a positive bias emphasizes rewards of activities, a negative bias emphasizes the threat or danger of an activity. The generic cognitive model theorizes that individuals have cognitive schemas, which are internally stored frameworks to organize categories of information such as stimuli, ideas, and experiences, as well as the relationship among them. When an individual uses their schemas, the meaning is derived from beliefs, expectations, and attributions. Negative schemas are strengthened by PTEs. The higher an individual's bias, the more at risk they are of developing a disorder. Alongside of PTSS and depression, it has also been suggested that first responders are more likely to experience suicidal ideation than the general population.

2.4. Suicidality/Suicidal Ideation/Suicide

Globally, nearly 800 000 people die by suicide annually and it is estimated around 20 times more individuals attempt suicide (World Health Organization, 2019). There are various theories about and terminology for suicide and suicidal behaviour. In this section, the most recent nomenclature used in the field of suicidology will be discussed. After this, three of the most prominent theories will be discussed. Shneidman's theory of suicide as psychache was selected as it has been described as the pioneer theory in the field of suicidology and other theories often stem from his work (Gunn & Lester, 2014). The second theory that will be discussed is the interpersonal-psychological theory of suicidal behaviour (IPTS), as this theory is one of the dominant theories in the field of suicidology. The IPTS theory was also

selected as it seeks to be a comprehensive theory to explain all near-lethal and lethal suicidal behaviour, while most other theories are developed with statements that suicidal behaviour is too multifaceted to be described by one theory. The last theory to be discussed is the integrated motivational-volitional (IMV) model of suicidal behaviour, as this model expands the IPTS by including additional variables not covered in the IPTS.

As the field of suicide research is continually developing, nomenclature is constantly being revised and refined (Silverman et al., 2007). To add to the knowledge of the suicidology field, it should be clarified exactly what is meant by the various terms. The definitions as suggested by Silverman et al. (2007) will be used, as they provide a clear distinction between suicide, suiciderelated behaviours and self-harm and it is beyond the scope of this thesis to examine the level of self-harm in firefighters. In this context, suiciderelated behaviour will be used to refer to self-inflicted, possibly harming behaviour when there is evidence that the person either attempted to use the intention of suicide to gain something else, or that the person attempted to die (known or unknown). Furthermore, the term suicide attempt is used for self-initiated, possibly harming behaviour with an intention to suicide, and a nonlethal result. Following this, the term suicide is used for occasions where an individual had implicit or explicit intent to die, followed by a self-inflicted death. In addition, the term SI is used for serious thoughts about taking one's own life (Lawrence et al., 2018; Van Orden et al., 2010). Various theories about the development of SI have been developed.

2.4.1. Theories of Suicide

Shneidman (1996) suggested three important factors that lead to suicidal ideation and behaviour. The first factor is psychache, which is intense psychological hurt people suffer that becomes so intolerable suicide appears to be the only solution. Psychache can combine with an intense hopelessness, narrowing an individual's thinking down to two options;

namely, the choice to let the psychache continue or the choice to end one's own life to stop the psychological distress. Shneidman called this combination of psychache and hopelessness mental constriction. When psychache and mental constriction are combined with a state of heightened arousal or agitation, called perturbability, an individual may feel driven to action. This third factor is generally what makes individuals move from suicidal ideation to suicide attempts or completed suicide.

A second theoretical model of suicide behaviour, the IPTS, incorporates the multiple factors that interact and result in suicide desire (or ideation), leading to suicide attempts (Joiner, 2005). Two risk factors interact and cause suicide desire; (a) thwarted belongingness and (b) perceived burdensomeness, together with hopelessness about these two states a person finds oneself in, such that a person feels these two states will never change. The first risk factor, thwarted belongingness, is a state where an individual considers themselves alienated from their social peers, friends, and family. It encompasses loneliness (the feeling of disconnectedness from others) and the absence of reciprocal care (the feeling of not having others to care for nor who care for them). Thwarted belongingness is a continually changing state of thoughts and emotions, influenced by inter and intra-personal factors, for example, family conflict and the inclination to interpret others' behaviour as rejection.

The second risk factor in the IPTS, perceived burdensomeness, is a state where an individual considers themselves a burden on friends, family and/or society. This risk factor encompasses the component self-hate and the component feelings of liability (the thinking that one's death is more worth to others than one's life). Again, this risk factor is continually changing, influenced by homelessness, unemployment, and low self-esteem, for example. While experiencing either thwarted belongingness or perceived burdensomeness is suggested

to produce passive suicidal desire, the interaction of both risk factors combined with the hopelessness feeling is proposed to cause active suicide desire.

Active suicidal desire is theorized to progress into suicidal intent when a third variable, acquired capability, interacts with the risk factors of thwarted belongingness and perceived burdensomeness described above. Acquired capability is defined as an individual's capacity to conquer one's innate urge for survival, which leads into lethal self-harm. It is suggested that repeated exposure to painful or dangerous events progresses into the habituation to physical pain and a lowered fear of death. Acquired ability is an accumulation of events, such as family history of suicide, previous suicide attempts and exposure to PTE's. High levels of all three variables, thwarted belongingness, perceived burdensomeness, and acquired ability, combine into active suicidal desire and capability to attempt suicide, meaning an individual's risk for lethal suicide behaviour is highly increased.

Joiner (2010) added the notion that an increase in exposure to traumatic experiences may lead to a decrease in fear of death, which in turn increases suicide risk. He suggested that while fear of death is a normal and beneficial part of life, when one becomes habituated to seeing death, it may take the fear of the pain away, which then takes away a barrier to suicide. This notion has major implications for firefighters and other first responders due to their elevated exposure to traumatic experiences.

In a systematic review of the predictions of Joiner's IPTS, Ma et al. (2016) found that the evidence of 66 studies was mixed. While the effect of perceived burdensomeness was the most frequently tested variable and had the strongest supported relationship with suicide ideation, less evidence was found for the other predictions, especially the critical interaction effects between all three variables. Only seven studies on the interaction between the three variables on suicide attempt were found, and only three of those studies showed significant

results. Ma et al. concluded that the IPTS may not be as specifically defined and underwritten as suggested and made several suggestions to explain these findings, including whether the measures used adequately capture the constructs (especially thwarted belongingness) and whether there are additional variables at play.

The view of additional variables at play is supported by O'Connor (2011) who built on the IPTS to develop the IMV model of suicidal behaviour. This model postulates that suicide, rather than a sequalae of mental disorders, is a behaviour resulting from a complicated interaction between thwarted belongingness, perceived burdensomeness and acquired capability together with other factors such as defeat and humiliation. The IMV model suggests that there are three phases in suicidal behaviour, starting with the premotivational phase before any ideation is formed, which entails the wider biosocial context, consisting of background factors, such as personality, and triggering events. The ideation is formed in the second phase, the motivational phase, which consists of defeat and humiliation appraisals (which are individual differences) triggering entrapment feelings, leading to the individual's thoughts that suicidal behaviour appears the only solution. The move from the defeat and humiliation stage to the entrapment stage is influenced by threat-to-self moderators, such as social problem solving and coping skills. The shift from the entrapment stage to suicidal ideation and intent is then influenced by motivational moderators, such as thwarted belongingness described above. Volitional moderators such as capability and impulsivity guide the shift from suicidal ideation to suicidal behaviour in the third phase, the volitional phase of behavioural enaction. Validating and using a model such as the IMV will enable practitioners and policy developers to better understand suicidal thoughts early on and help identify and predict the shift to suicidal behaviour, for earlier and more efficient intervention.

In response to a call by Klonsky and May (2014) to use an 'ideation-to-action' framework for all suicide theory, research, and prevention, Dhingra et al. (2015) examined the differences between ideation and attempts at suicide within a multivariate context. They surveyed 230 attempters, 583 individuals who considered death by suicide, whom they called ideators, and 475 individuals without a suicide history and found that attempters had higher risk of having ties to someone self-harming or suicidal than ideators. Ideators were also less likely to be impulsive or fearless about death.

Jakupcak et al. (2009) examined the link between PTSS symptoms and suicide in 435 US veterans and found veterans with PTSS symptomatology (roughly half of the participants) were four times more likely to portray suicidal ideation. This risk increased when veterans also had a comorbid disorder, such as depression. Twelve of the veterans indicated having made a suicide attempt in the four months prior to the research.

Panagioti et al. (2012) undertook a systematic review and meta-analysis of the association between PTSS and frequency of suicidality. They found 63 studies to include in their meta-analysis and found a highly significant relationship between PTSS and suicidality. This relationship was significant regardless of which mode of suicidality was used, such as suicide attempts, suicide behaviour or SI, except for completed suicides. Panagioti et al. further concluded that this association was compounded with a comorbid depression diagnosis.

Further, Boffa et al. (2017) studied the association between PTSS and suicidality in 893 US firefighters and found that higher levels of PTSS were linked to higher rates of lifetime SI as well as prior attempts. Boffa et al. found that a single point increase in their PTSS measure was related to a 5.2% increase of prior attempts. They further examined the specific PTSS sub-clusters and found that a higher level of re-experiencing symptoms was linked to 15.4% higher odds of a prior attempt. There are also various protective factors against the

development of psychological distress. One of these protective factors is self-regulation skills, which will be discussed in the next section.

2.5. Self-Regulation Skills

A growing body of literature in the field of trauma recognizes the importance of differences between individuals that influence the rate of trauma-related symptoms (Beckmann, 2002; Regehr et al., 2000). As described earlier, an individual's emotion during a PTE and how they deal with the aftermath is in large part indicative of how susceptible they will be to the effects of the stress (Beckmann, 2002). Differences in emotion regulation have been shown to impact interpersonal functioning and well-being (Gross & John, 2003). Stressful life events have been found to be particularly damaging to individuals' wellbeing when self-regulation skills and coping abilities are low (Baumann et al., 2005). To develop more efficient strategies for prevention as well as intervention of the rates of PTSS, depression, and suicidal ideation, a better understanding of differences in self-regulation skills that influence the level of these mental injuries should be developed.

Emotions are largely uncontrollable responses, such that individuals cannot produce or cease an emotional state by will (Baumeister et al., 2007). Individuals can; however, effectively regulate their emotions by indirect strategies, that is, they cannot control their emotion directly, but can distract themselves until the emotion dissipates. This self-regulation has been referred to as a significant dimension of what makes us human. The term self-regulation skills will refer to the individual regulating processes or modifying one's own responses and internal states. This adjustment is generally done through overriding one's response and replacing it with a different, preferred response (Baumeister et al., 2007).

Self-control has been conceptualized as the ability to overrule a temptation or urge in order to achieve a goal, that is the ability to change the way one feels, thinks or behaves in

order to achieve the best possible long-term outcome (Hoyle & Moshontz, 2018; Muraven & Baumeister, 2000). While the terms self-control and self-regulation in the literal sense are different, in that self-regulation covers the planning and monitoring of progress, while self-control does not, the scores on self-control measures have been found to predict behaviour that reflects the critical features of self-regulation (Hoyle & Moshontz, 2018). In literature, the terms self-control and self-regulation have been suggested to be interchangeable (Vohs & Baumeister, 2004) and the term self-regulation will be used from here on. Self-regulation has been widely measured by the 13-item Brief Self-Control Scale (BSCS), which examines processes directly involving self-control. It has shown good reliability and validity among college students and community samples (Malouf et al., 2014; Tangney et al., 2004).

Understanding differences in self-regulation skills is important, as these differences can emerge in levels of rumination an individual engages in (Vohs & Baumeister, 2004). Rumination has been suggested to play an important role in the development of PTSS and depression as well as an increased risk of SI (Brewin & Holmes, 2003; Dhingra et al., 2016). Individuals with lower self-regulation skills have also been found to be more likely to be heavy drinkers, which is in turn an important predictor of risky behaviours (Quinn & Fromme, 2010). Higher self-regulation scores on the BSCS have been linked to more effective functioning, in that individuals with higher scores tended to have higher grades in school, better relationships, higher levels of empathy, and better psychological adjustment (Tangney et al., 2004). Tangney et al. reported that higher self-regulation was linked to fewer mental health problems as well as higher self-esteem, and individuals with higher self-regulation were less likely to experience impulse control problems such as problem drinking. These results are important, as first responders have been shown to have impulse control difficulties such as with drinking, which in turn increases suicidal ideation.

The ability to self-regulate has also been found to be an important determinant in the recovery from PTEs; individuals with higher levels of self-regulation skills were found to appraise threats as less harmful, which resulted in less intense emotional responses and rumination (Benight & Bandura, 2004a; A. J. Smith et al., 2015). Lastly, Malouf et al. (2014) indicated that individuals with lower self-regulation skills were more likely to report attempted suicidal behaviours. The self-regulation research results discussed in this section raise a critical question, that is, whether firefighters are enabled to employ sufficient self-regulation skills in order to increase their mental well-being, despite the trauma they so regularly encounter.

2.6. Summary

In this chapter, a summary of literature on first responders and their work showed the wide range of emergencies and PTEs first responders are likely to be exposed to. For firefighters in particular, this work comes with a range of physical and psychological stressors, and in NZ, firefighters may be the first to arrive at purple calls. This chapter also covered PTSS, depression, and SI as mental health conditions that are more likely to develop after the accrual of traumatic experiences. Rates, predictive factors, and theories of each of these conditions were discussed. The chapter finished with a review of self-regulation skills as a moderator between exposure to PTEs and the development of PTSS, depression, and SI. The following chapter will discuss PTSS, depression, and SI in first responders, and in firefighters in particular.

CHAPTER 3: PTSS, Depression, and SI in First Responders/Firefighters

This chapter reviews the current literature on PTSS, depression, and suicidality in first responders, and in firefighters in particular. This topic needs to be investigated to provide an overview of PTSS, depression, and SI in firefighters, and to identify the gaps that need to be addressed. The second part of this chapter will outline the gaps in the literature discussed in Chapters 2 and 3 that this study aims to address.

3.1. PTSS and Depression in First Responders

As described in Chapter 2, due to the nature of their work, first responders are particularly susceptible to the depressogenic effects of the exposure to traumatic events (Pennington et al., 2018). Surprisingly, while PTSS in victims has been extensively examined, there is a paucity in studies examining first responders. For example, Haugen et al. (2012) discussed the surprising paucity of literature on effective treatment of PTSS in first responders, as the wide research on PTSS in veterans forms a basis of PTSS treatment guidelines. Only three of seventeen studies in their literature review included firefighters as participants; Coupland (2009), Difede et al. (2007) and Kitchiner (2004). A systematic review by Jones (2017) found 27 articles published between 2000 and 2015 which focused on mental and behavioural health concerns in first responders and used the results of these studies to develop a profile of the mental health of first responders. Stephens and Miller (1998) surveyed 527 NZ police officers[1] and consistent with previous literature, found the rate of PTSS symptoms to be similar to civilians who experienced a PTE. They further found that cumulative PTEs resulted in higher PTSS symptoms. Another interesting finding was that police officers without educational qualifications reported higher PTSS scores than police officers with secondary or

[1] The sample included only 58 females, which was reflective of the percentage of female officers in the force at that time.

tertiary degrees, which also confirmed previous literature findings (e.g., Norris, 1992; Vincent et al., 1991). A possible explanation is that intelligence appears to be a protective factor against the development of PTSS, as discussed by Breslau et al. (2013).

Fullerton et al. (2004) examined levels of acute stress disorders, PTSS, dissociative symptoms, depression, and health care use in disaster workers. The sample consisted of 207 disaster workers who were part of an airport disaster and rescue response team that were exposed to an airplane crash and 421 comparison disaster and rescue workers. Acute stress disorder, PTSS, and depression levels were assessed at 1 month, 7 months and 13 months after the airplane crash. Results showed a higher risk for acute stress disorder (25.6%), PTSS (16.7%), and depression (21.7%) for the disaster workers that were exposed to the crash. Early dissociative symptoms were linked to higher risk of PTSS and depression, which indicates a possible avenue for intervention, as evidence has been found in literature that individuals who dissociate during a trauma are more likely to develop PTSS (Ozer et al., 2003).

Klimley et al. (2018) discussed the limited research on the impact and services available for first responders, despite the estimated 80% trauma exposure and 10-15% PTSS diagnoses. Klimley et al. conducted a literature review to assess PTSS in first responders and to examine rate, risk and protective factors, resources, and comorbid diagnoses. The review did not find studies examining gender and ethnic differences in firefighters' PTSS development; however, they did discuss some studies examining experience and age disparities. Klimley et al. pointed out that firefighters have some unique differences compared to other first responder populations, such as volunteer and career staff as well as the types of traumatic events. They found some evidence that volunteers developed higher levels of PTSS symptoms than career staff. Klimley et al. also uncovered an interesting difference in age between several studies;

one found younger and unmarried participants portrayed higher PTSS symptoms, whereas two other studies found older participants portrayed higher PTSS symptoms. These studies did not control for other variables, such as social support, amount of PTEs, and years of experience, which may account for some of the variance.

Jones et al. (2018) examined a first responders' sample of 220 retired and current firefighters and paramedics. Their findings showed that 14% of the first responders experienced moderate-severe and severe depressive symptoms, 28% moderate-severe and severe anxiety symptoms and 26% significant PTSS symptoms. In addition, 34% reported high suicide risk. They further found that being female, shifts of 48 hours or more, rural department settings, being in a relationship, having a medical history of hypertension, or a (previous or current) mental health diagnosis and treatment were significantly associated with increased levels of depression, PTSS, anxiety and SI. Lastly, Jones et al. found that the rank of Captain was associated with lower anxiety than the rank of firefighter, and smaller department sizes were correlated with higher risks of suicide compared to medium sized departments, but not with large sized departments. Overall, Jones et al. found that the workplace culture of self-reliance was likely to be a barrier to seeking mental health support, and suggested healthcare providers be aware of this culture when considering first responder treatment. These findings have important implications for mental healthcare of first responders.

One of the most recent articles that examined first responders investigated the relationship between different components of received social support and PTSS in emergency responders from both NZ and the Philippines (Guilaran et al., 2021). Guilaran et al. found that higher social support was associated with lower PTSS levels. Furthermore, another recent article examined PTE exposure, work-related stressors, and gender as risk factors in the

development of psychological distress in ambulance personnel (Reti et al., 2021). In the following section, PTSS and depression in firefighters in particular will be discussed.

3.2. PTSS and Depression in Firefighters

Experts have suggested that 91.5% of firefighters have been or will be exposed to PTEs, while approximately one third of firefighters report three or more traumatic events in their lifetime (Meyer et al., 2012). PTSS levels in firefighters have been estimated to be as high as 22% (Chiu et al., 2011). Del Ben et al. (2006) found a PTSS level of 8% in 131 firefighters from two US states. While there have been some developments in first responders' literature since this 2006 study, studies with a specific focus on firefighters are still limited. For example, Haugen et al. (2012) in a literature review on PTSS treatment in first responders collected 17 studies based on their exclusion criteria (treatment study, first responders, English language and PTSS primary outcome). They highlighted the surprising paucity of literature on effective treatment of PTSS in first responders, compared to other trauma populations, such as veterans, which are often used as a basis for PTSS treatment guidelines. Haugen et al. suggested that it is possible that the absence of affiliation between first responder organizations and academic institutions may be a reason for the lack of treatment research.

A systematic review by Jones (2017) found 27 articles published between 2000 and 2015 which focused on mental and behavioural health concerns in first responders (18 on firefighters) and used the results of these studies to develop a profile of the mental health of first responders. The profile showed that firefighters are at increased risk of PTSS, depression, suicidality, alcohol misuse and sleep disturbance. Risk factors identified were work hours, levels of strain/stress, increased health concerns and emotional problems, previous psychological treatment, marital status, perceived family and social support, and

sense of coherence. Risk factors for suicidality further included career versus volunteer status, and a history of responding to a suicide attempt or death. Lastly, factors such as starting age at the job, years of service, rank, and military status, although she pointed out literature has presented varying risk levels for these factors. Jones suggested this profile be used to make recommendations for modified strategies in mental health treatment of at-risk first responders. She further pointed out there is a gap in the current knowledge, and help-seeking needs to be encouraged, while mental health problems among first responders need to be diminished.

Jones et al. (2020) further examined variables that shaped first responders' perception of mental health problems and interfered with help-seeking behaviours. Through interviews they identified three broad variables; knowledge, barriers to help-seeking, and facilitators to help-seeking. They identified five sub themes in the barrier category, including *cannot show weakness* and *negative experience with a therapist*. The participants further indicated that variables such as *positive therapist experience* and *realizing I'm not alone* facilitated help-seeking behaviour. Knowledge incorporated both the other factors, such that lack of knowledge was a barrier, while increased knowledge became a facilitator. Jones et al. concluded that more knowledge for both first responders and care providers would enable barriers to help-seeking to be lowered. There are several risk and protective factors for the development of PTSS and depression in firefighters. Understanding these risk and protective factors are important for understanding trauma responses and the subsequent development of policies and intervention strategies to improve firefighters' mental health.

3.2.1. Risk and Protective Factors

3.2.1.1. Risk Factors

Pretrauma catastrophic thinking and rumination have been found to be among the biggest predictors of symptoms after a traumatic experience (Bryant & Guthrie, 2005). A second study found that higher hostility levels and lower self-efficacy were associated with an increase of PTSS symptoms (Heinrichs et al., 2005). Furthermore, a decrease in social support and self-efficacy was found in experienced firefighters compared to new recruits, which could indicate previous protective factors decrease over time (Regehr et al., 2000). Besides risk factors, various comorbid factors have also been found.

3.2.1.2. Comorbid Factors

Haslam and Mallon (2003) found comorbid sleep disturbances and rumination in firefighters with PTSS. In addition, Carey et al. (2011) found sleep disturbances were more common than drinking, smoking and caffeine use. Similarly, Haddock et al. (2012) found firefighters were heavy drinkers. More recently, L. J. Smith et al. (2018) examined levels of PTSS with the comorbidity with alcohol use disorder (AUD) as well as sleep disturbance severity and found that higher severity of alcohol use and sleep disturbance were associated with increased PTSS levels. Protective factors have also been found and will be discussed next.

3.2.1.3. Protective Factors

International literature has found multiple factors that protect firefighters from developing or increasing PTSS and depression. For example, Sliter et al. (2014) found that humour was a very effective way to cope and indeed provided a buffer to the effects of traumatic experiences in firefighters. Rowe and Regehr (2010) provided an overview of the literature

on black humour, which they defined as humour used in coping with critical incidents, concerning sinister topics with the aim of expressing the callousness or cruelty of the world. They suggested that not only is black humour used almost universally by emergency personnel, but it is also vital to their profession, as a method of venting of feelings, eliciting social support, and distancing from the situation in order to increase their efficiency. Dangermond et al. (2022) examined black humour in Dutch firefighters and added to this that black humour tends to be used as a means of starting the conversation. They pointed out the black humour enables a discussion of emotions, through which group dynamics are positively influenced. Stanley, Hom, et al. (2019) found that a sense of belongingness and in particular social support from family and friends, supervisors and coworkers accounted for decreased PTSS symptoms. Further important protective factors are training, experience, sense of self-worth, peer cohesion and social support (Klimley et al., 2018). Lastly, distress tolerance has been found to mediate occupational stress and suicidality in firefighters (Stanley, Boffa, et al., 2018).

A cross-national study examining posttraumatic reactions of 1,916 firefighters from 8 European countries (Czech Republic, Germany, Italy, Poland, Spain, Sweden, Turkey, and the U.K.) found differences in PTSS symptoms and posttraumatic growth (PTG) between countries (Kehl et al., 2014). First responders from Italy, Poland and Turkey indicated higher trauma symptoms than the mean, while those from Spain, the U.K. and Sweden showed lower symptoms than the mean. Furthermore, more PTG was found in firefighters from the Czech Republic and Turkey, while first responders from Italy, Poland and the U.K. reported lower scores than the mean. The results showed traumatic events could result in both positive and negative outcomes for firefighters, with different outcomes for different countries. While differences between the various countries were found, the cause for those cultural differences still needs investigation. A further limitation of this study was that the criteria of having

experienced a stressful incident in the last 10 years led to the exclusion of older and more likely employed as career rather than volunteer firefighters.

Armstrong et al. (2014) examined PTSS and PTG in a sample of 218 firefighters and found that traumas from multiple sources (for example, personal and work life), higher levels of organisational and operational stress and use of coping mechanisms all significantly predicted PTSS. Those participants who experienced trauma at both work and in their personal life reported higher PTSS than those that only experienced trauma at work. The work context variables encompassed critical incidents and management, as well as sense of belongingness to the organisation, and these variables were found to be the strongest of the predictors of higher PTSS. The study further found that traumas from multiple sources, coping and social support influenced PTG. It was suggested that the training as well as the repeated exposure could prepare firefighters enough for PTEs that their assumptions about the world are not shattered, as they would be for the general public. In other words, while the general public does not expect traumatic events to happen, and therefore is at higher risk to be traumatized by PTEs, firefighters are trained and expect PTEs. Armstrong et al. further suggested that coping mechanisms and social support may be mediated by self-disclosure or the breaking of core beliefs. A limitation of this study was that they did not examine how many PTEs the participants had experienced.

Coping strategies were investigated by Arble and Arnetz (2017), who surveyed 3,656 Swedish first responders. The sample was made up of coast guard, emergency medical services, military, police, customs control, and fire department. Unfortunately, only 751 of the respondents were female, resulting in an inequitable depiction of the sexes across agencies, as well as a distinctively low number of women across agencies. The data from this survey was used to develop an empirical model of coping strategies, where exposure to stress

(measured through items such as “Working among the public has become more dangerous”) related to well-being (e.g., “How is your health at the moment?”) through various indirect paths. The indirect paths were classified as being either approach (e.g., “Talking to support personnel helps me manage professional stress”) or avoidance (e.g., “I counteract professional stress by not thinking about it”) coping behaviours, and overall, approach coping behaviours were associated with better well-being outcomes. Arble and Arnetz discussed that the nature of first responders’ work means they are frequently exposed to stressors, indicating the vitality of effective and sustainable coping strategies.

In order to perform a longitudinal analysis to assess whether previous disaster exposure influenced the possibility of a PTSS or depression diagnosis, 35 male firefighters were examined over a three-year period at the start of their firefighting career (Pennington et al., 2018). Pennington et al. (2018) investigated pre-academy disaster exposure, depression, PTSS, work trauma and social support. The participants did not differ on depression or PTSS at the baseline; however, after the first three years of service, the pre-academy disaster-exposed firefighters showed a significant increase in depression, while the non-exposed participants showed a small decrease. This same significant difference showed when Pennington et al. controlled for traumatic events experienced during the first three years of work. No significant differences in PTSS were found between the two groups. A limitation of this study was the small sample size, indicating a need for future research with larger populations.

Wagner and O’Neill (2012) investigated the mental health implications of being a volunteer firefighter in Canada, examining 64 volunteer firefighters and comparing them to 103 similar individuals. They examined PTSS, other mental health difficulties such as depression, anxiety and interpersonal sensitivity, and personality domains. They found

significantly higher levels of PTSS in the firefighter sample than in the comparison sample, but no significant differences in other mental health symptoms or personality domains. Limitations of this study were that nonoccupational stress was not measured, and the sample was taken from rural areas, which may limit the ability to generalize to urban and other volunteer populations.

Kleim and Westphal's (2011) comparison of studies on PTSS and depression in first responders reports three studies examining firefighters, with PTSS and depression levels ranging from 18% to 68% and 27% of firefighters suffering from a mental health disorder in general. They included a brief discussion on the importance of their results for the development and implementation of prevention and intervention strategies; however, they point out the controversy in literature regarding the type, time, and receivers of these interventions. The implications discussed in this review include first responders with risk factors such as previous mental illness or injured during rescue operations being at higher risk for PTSS. Finally, they point out the need to identify more protective factors in first responders, as this data would be vital for developing and implementing evidence-based prevention programs.

Hom et al. (2017) surveyed 290 female firefighters and found that 21.7% reported sexual harassment, and 20.3% other threats or harassment while on the job. They further found that both forms of harassment were significantly linked to an increase in the probability of career suicidal ideation as well as more severe mental health issues. In 2015, out of 1,160,450 U.S. career and volunteer firefighters, only 7.3% were female. They found that more than half of the female firefighters did not report the harassment to their supervisors. Hom et al. did state that when supervisors were aware of the harassment, in general the complaints were addressed, and to the satisfaction of the firefighters. This finding suggests that harassment

may be an underrecognized issue among governance of fire brigades. The limitations of Hom et al. (2017) were that their measures did not include whether the culprit of the harassment was another firefighter, or a layperson.

Onyedire et al. (2017) examined the work locus of control of 116 Nigerian career firefighters (18 females). They found that an external work locus of control predicted more PTSS symptoms. They further found a high level of PTSS, namely 48% and suggested this may be due to the higher average age and cumulative effects of PTE exposure, as well as challenging circumstances for Nigerian firefighters, such as lack of resources.

In summary, this section covered a wide range of protective factors in the development of PTSS and depression in firefighters that have been examined in literature. Some important protective factors that were discussed included sense of belongingness, social support, and distress tolerance. Some limitations of these studies were that the amount of PTEs and the moderation effect of self-regulation skills were not examined. Another important link to discuss is the link between PTSS and SI.

3.2.2. Link Between PTSS and Suicidal Ideation

The link between PTSS and the increased risk of SI is an important link to understand. A meta-analysis of 63 studies found evidence of a strong relationship between PTSS and higher suicide risk, which was increased by comorbid major depression (Panagioti et al., 2012). This increased risk was found regardless of whether the samples were clinical populations with a primary diagnosis of PTSS, other clinical populations or nonclinical populations; PTSS diagnostic timeframes (e.g., current of lifetime); and what measures of suicide risk were used. Various studies have found a relationship between PTSS and suicidality risk in firefighter populations as well. For example, Martin et al. (2017) found that PTSS symptom severity was significantly associated with suicidality in a sample of 3,036 U.S. career firefighters.

Boffa et al. (2017) concluded that more severe PTSS was linked to higher risks of suicidal ideation as well as suicide attempts in their sample of 893 career and volunteer firefighters. They further examined the more specific parts of PTSS that increased suicidality and concluded that the numbing and re-experiencing symptom clusters were significantly associated with suicidal ideation and the re-experiencing symptom cluster alone was significantly related to increased prior suicide attempts.

3.3. Suicidality/Suicidal Ideation/Suicide in Firefighters

It is difficult to quantify the exact number of firefighters that experience suicidal ideation, due to barriers in reporting (Kehl et al., 2014). These barriers include mental health stigma, fear of occupational impacts and firefighter culture. Further reasons for not reporting mental health difficulties unique to firefighters are the fact that firefighters work in a crew and reporting mental health issues may affect their working relationship with their firefighting partners, or their firefighting partners' view of their dependability (Kehl et al., 2014). It has been suggested that NZ's culture of "Toughen up", "Man up" and "She'll be right" has a negative impact on mental health (Adams et al., 2018; McCool, 2017). It stands to reason that this general culture in NZ also acts as a barrier for NZ firefighters. It has been suggested that firefighters are more likely to die by suicide than general population (Hom, Stanley, Ringer, et al., 2016). Klimley et al. (2018) estimated that fire brigades are three times more likely to experience a colleague dying by suicide than a death in the line of duty.

Stanley et al. (2017b) surveyed 313 current U.S. female firefighters to evaluate precareer and career rate of suicidality. The results showed that precareer rates of suicidal ideation, plans, attempts and nonsuicidal self-injury (NSSI) significantly predicted the respective career rates. Stanley et al. called for future research to be done in this research field, including retired female firefighters, examining the association between psychiatric

symptoms and suicide risk as well as genderbased discrimination and workplace bullying in female firefighters to enhance the findings.

In another study, Stanley et al. (2017) examined differences in psychological differences and mental health support seeking behaviours between professional and volunteer male and female firefighters in the United States. They also investigated whether the interaction between barriers to help seeking and symptom differences. Their sample consisted of 204 volunteer firefighters and 321 professional firefighters and results showed that volunteer firefighters were significantly more likely to experience depression, PTSS and suicidality, while professionals revealed increased alcohol misuse. Furthermore, volunteer firefighters conveyed higher barriers to mental health care such as availability and costs. They pointed out that the barriers explained a large proportion of the differences in psychological symptoms between the volunteer and professional firefighters.

Furthermore, as previously mentioned, firefighters are often portrayed as heroes in the media and, specifically in NZ, have been the ‘most trusted profession’ for five years running, from 2016 through to 2020 (Colmar Brunton, 2020). The public portrayal and reputation concern together may put an inordinate pressure on firefighters and increase reluctance to seek mental health support. For example, the National Volunteer Fire Council (2012) has suggested that the percentage of first responders that seek help may be significantly lower than the general population, due to concerns regarding stigma, worries regarding limits of confidentiality, and the overall culture of independence and self-sufficiency.

Stanley (2015) surveyed a sample of 1,027 active and retired firefighters and found worrying statistics, where 46.8% of the sample indicated they had at some point experienced suicidal ideation. Further, 19.2% reported having (had) a plan for suicide, while 15.5% had made a suicide attempt during their firefighter career. The majority (91%) of their

participants were male. Stanley et al. further reported that factors that appeared to increase firefighter's risk of suicidal ideation and behaviours included lower rank, less years of service, attendance of calls involving suicides, and active duty military status.

Hom et al. (2016) examined the subsample of 483 firefighters of the above sample that had experienced suicidal ideation and/or attempts, to further investigate their mental health service use. The finding that 77% of the participants indicated having received mental health treatment is important, as it has been found that this number is less than 50% in the general population (Schmitz et al., 2012; Stanley et al., 2016a). Hom et al. discussed that the more severe the suicidal behaviour, the more likely participants had received treatment. A limitation of the study was the use of a convenience sample, and Hom et al. suggested that replication be done with a probability sampling strategy. Further recommendation is that future studies include finding out the timeline of suicidality and treatment and whether the treatment was specifically for suicidality or other issues. Lastly, Hom et al. indicated the measure used in future studies should be valid for self-report.

A study examining the interaction between sensitivity to anxiety, PTSS levels, and suicidality in 254 female firefighters found that higher levels of anxiety sensitivity in female firefighters was associated with a stronger link between PTSS symptoms and suicidality (Stanley, Hom, et al., 2017a). Stanley, Hom, et al. suggested the results could be explained with Shneidman's (1996) psychache theory. This theory suggests that people who suicide or make an attempt to suicide, do so as a result of shame, fear, guilt, and anxiety augmenting into insufferable pain.

Stanley, Hom, et al. (2017a) analogized this insufferable psychological pain to the insufferable anxiety symptoms that are at the core of PTSS and therefore concluded that the anxiety sensitivity could be a symptom of this psychological pain. Stanley et al. (2018)

further examined the risk factors for and protective factors against suicide in 832 firefighters. The results showed on the one hand that higher levels of occupational stress were linked to greater levels of suicide risk, on the other hand more distress tolerance reduces that suicide risk, including threats and intent. This study is important as it gives fire services around the world a prevention target idea.

Stanley et al. (2019) furthermore argued that increased PTSS levels were concomitant to higher suicidality severity, yet this was alleviated if participants scored higher on two of the five mindfulness facets: the *acting with awareness* and the *nonjudging of inner experience.* On the contrary, higher scores on the *observing* facet of mindfulness resulted in a stronger association between high levels of PTSS and suicidality.

Limitations of most current studies of PTSS in first responders is that the majority is small-scale studies, most of which use self-report rather than structured clinical interviews (Haugen et al., 2012). Ozer et al. (2003) did note that there is a general reliance on self-reports in psychological literature, and in particular so with PTSS research. There are obvious ethical constraints to the ability of exposing participants to PTEs, and therefore, there is a need to rely on retrospective methods in these areas of research (Ozer et al., 2003). A scoping review has been conducted to map out the state of the existing research on the precursors of suicidal ideation in firefighters; however, first the state of Australasian literature on this topic will be discussed.

3.4. Australasian/New Zealand Literature

McFarlane and Papay (1992) found that 13% of firefighters were diagnosed with PTSS and 9% with depression after an Australian bushfire disaster. Comorbidity, especially panic disorder and phobic disorders was an important predictor of the chronicity of PTSS, and

onset of anxiety and affective disorders was influenced by experienced difficulties both before and after the catastrophe.

McFarlane and Yehuda (1996) suggested that individual characteristics may be the most significant factor in the development of PTSS symptoms and understanding of personal predictors of trauma symptomatology was key to successful intervention strategies. McFarlane and Yehuda's (1996) work was complemented by Regehr et al. (2000), who examined the influence of individual variances in vulnerability on the strength and period of trauma-related symptoms. Regehr et al. indicated that previous research had found that three factors together appeared to influence the severity and chronicity of PTSS symptoms in first responders: the first factor is the intensity of the trauma itself, the second factor is experienced social support and the third, individual strengths and vulnerabilities. The last category entails characteristics such as coping mechanisms, biological predisposition, cumulative life stressors, and previous mental health issues (Regehr et al., 2000).

In order to explore the relationship between these three categories of individual factors, social support and traumatic stress reactions, Regehr et al. (2000) examined 164 Australian firefighters and found that 7% of firefighters reported severe levels of PTSS, and 68% moderate-level PTSS. They administered surveys to 99 career and 65 volunteer firefighters and concluded that lower perceived social support from employment, family and friends was associated with higher depression scores. After PTEs, firefighters were more likely to experience depression and PTSS symptoms when they reported feeling insecure, lack of personal control or alienation from others.

Chamberlin and Green (2010) examined Australian firefighters from South-East Queensland and compared 42 recruits, 51 on-shift firefighters, and 52 firefighters who recently attended a fatal incident. They found that coping strategies were linked to higher psychological distress and PTSS; after these were accounted for, help-seeking behaviour was

linked to lower PTSS. Two limitations of these measures were that social desirability was not measured and exercise, which is a common reported coping strategy, is not measured well on the measure used to assess coping strategies, the Brief COPE.

Chamberlin and Green (2010) further found that higher age, rank, and years of service influenced the level of distress reported; however, discussed that the relationship and influence of each separate variable is hard to assess, as for example age was highly correlated with years of service. Chamberlin and Green stated that other international studies have found varying results for the three factors of age, rank, and years of service: for example, Corneil et al. (1999) found that years of service was influential in PTSS symptoms in Canadian firefighters, while rank was a predictor for United States firefighters. It should be noted that the sample of Corneil et al. was larger (203 U.S. and 625 Canadian firefighters), and the Canadian firefighters had higher average years of service and fewer serious on-the-job injuries than the U.S. firefighters. Corneil et al. did not find a significant difference in PTSS level between the two groups, despite the U.S. firefighters attending a significant higher number of PTEs. A protective factor found in the U.S. firefighter sample, but not in the Canadian, was being married. Both samples showed that higher social support (work and family) was associated with lower PTSS levels.

Harvey et al. (2016) examined 753 New South Wales firefighters and found that the 488 current firefighters displayed a PTSS rate of 8%, depression 5%, and high alcohol use 7%. The estimated rate of both PTSS and depression in the 265 retired firefighters was 18%, with a 7% heavy drinking consumption. Harvey et al. further reported a significant positive association between the number of fatal incidents (PTEs) attended by the firefighters and their rates of PTSS, depression, and high alcohol use. The results of the study call for improving procedures for mental health welfare for current as well as retired firefighters.

Another study examining psychological distress in Australian firefighters was conducted by Skeffington et al. (2016), who conducted a randomised control trial to examine the efficacy of a training intervention (Mental Agility and Psychological Strength) with a sample of 45 career recruits of Department of Fire and Emergency Services in Western Australia. This study examined PTE exposure, PTSS, perceived social support, and coping styles as well as depression, anxiety, and stress. The results did not support the hypothesis that the training intervention would increase the recruits' trauma knowledge as well as their perceived social support and coping compared to a control group, which received training as usual. Skeffington et al. suggested various explanations for the fact that the results did not support the hypothesis, such as barriers to treatment as well as that the measurement chosen for this study, the trauma stress schedule (TSS) is developed for civilians. Skeffington et al. suggested that future studies use a different or adapted measure, for example, the adapted TSS from Stephens and Miller (1998), which includes five items especially relating to police work, such as death of a known police officer and attendance at severe accidents.

Skeffington et al. (2017) further examined 210 professional DFES firefighters and found, as expected, their exposure to PTEs and consequent PTSS were significantly higher than the general population. Skeffington et al. also found that PTSS differed depending on the interaction of social support, trauma exposure, and coping styles. They concluded this was particularly the case for maladaptive coping strategies, such as distraction, substance use, and self-blame, and suggested that these should be targeted in treatment interventions, alongside of strengthening of adaptive coping strategies, such as positive reframing and emotional support.

More recently, a large study was undertaken by Australia's national mental health service Beyond Blue and the University of Western Australia examined the mental health and wellbeing of police and emergency services (Lawrence et al., 2018). The study had a total of

21,014 participants and has created a baseline of national rate data and risk and protective factors. Results showed that one in three employees reported high psychological distress, compared to one in eight for all Australian adults; one in 2.5 employees and one in three volunteers are diagnosed with a mental health condition compared to the national rate of one in five; suicidal ideation was twice as high, with suicide plans three times more likely than the average population; employees with more than 10 years' experience were twice as likely to experience psychological distress and six times more likely to experience PTSS. Important findings were that workplace malpractices and negative culture were as damaging as PTEs, while three out of four employees regarded the current workers' compensation process harmful to their recovery.

Lawrence et al. (2018) drew three main conclusions from this study: workplace support was associated with PTSS and psychological distress rate, such that the more supportive the workplace, the lower the rate of PTSS; many individuals scoring high on distress measures did not recognize they were experiencing mental health distress; individuals reported self-stigma and a fear of others judging them, while they positively regarded and supported colleagues who experienced mental health distress.

Bryant et al. (2019) conducted a study on 100 Australian emergency services personnel with diagnosed PTSS examined the efficacy of cognitive behaviour therapy (CBT), including a comparison between waitlist, long (CBT-L; 40 minutes) and brief (CBT-B; 10 minutes) exposure per session. The personnel consisted of 79 police officers, 12 firefighters and 9 paramedics. The results portrayed that, while there was no significant difference between CBT-B and CBT-L, both CBT treatments revealed higher declines in PTSS and depression levels, as well as on maladaptive appraisals about the world and self. Furthermore, CBT resulted in larger progress in psychological and social quality of life.

One of the few studies in NZ that examined the well-being of first responders after a large traumatic event, was conducted by de Terte et al. (2014), who developed and evaluated a three-part model of psychological resilience in 176 NZ police officers. De Terte et al. found that social support, adaptive health practices, adaptive coping, and optimism were helpful in alleviating the effects of adversity faced by police officers.

A further study in NZ was undertaken by Surgenor et al. (2015), who investigated posttraumatic stress symptoms in police following the Canterbury earthquakes. They found that the levels of symptoms reported by the police were influenced by factors such as negative emotional coping, concern for significant others and grotesque scenes.

A further study into the risk and protective factors for PTSS in frontline workers after the 2011 Canterbury earthquake by McBride et al. (2018) examined 226 individuals, comprising of 48 "frontline" workers, 37 ambulance workers and 141 teachers and nontraditional frontline workers (including Māori wardens and demolition workers). The study used a longitudinal design and gauged potential protective factors, such as overall wellbeing, social relationships, and other social supports as well as emotional distress and possible psychiatric morbidity. Potential risk factors were PTSS, and exposure to PTEs. Results showed that 21% did not, while 79% did develop PTSS after 18 months.

Finally, a study examining psychological wellbeing and help-seeking stigma in 2,805 New Zealand Defence Force personnel found that engaging in help-seeking behaviour alleviated psychological distress (Hom et al., 2020). The results of this study show the importance of addressing the stigma that can be associated with help-seeking behaviours.

3.5. PTSS, Depression, SI, and Self-Regulation

International literature has shown that the cumulative effect of traumatic experiences increases the risk of developing PTSS in first responder populations. PTSS in turn has been

shown to be significantly associated with increased risk of suicidal ideation and suicide attempts. This effect is compounded with comorbid depression. While the cumulative effect of traumatic experiences has been shown to increase the risk of PTSS, depression and SI, there are also factors that have been shown to be protective during this process. Brewin and Holmes (2003) also reported that posttrauma, cognitive appraisal of the cause of, responsibility for, and future implications of the trauma provide numerous opportunities to generate negative emotions. If automatic appraisals influence the development of PTSS, self-regulation is a way where one can override these automatic appraisals, therefore alleviating the risk of developing PTSS.

If professionals were able to intervene in this process, by helping the individual to regulate their cognitive appraisals and their rumination, it would follow that they were less likely to experience (or experience less intense) PTSS, depression and SI (Boden et al., 2013). Inaccurate, negative appraisals of a traumatic event, and lack of revision based on newly acquired information, produce a sense of current threat, and contribute to the maintenance of PTSS symptoms (Ehlers & Clark, 2000). This conceptualization suggests that individuals with PTSS may over-utilize avoidant emotion regulation strategies such as expressive suppression and under-utilize cognitive reappraisal. Cognitive reappraisal has been theoretically identified as a key mechanism by which individuals with PTSS can expect improved outcomes (Ehlers and Clark, 2000).

For the purposes of this thesis, the final construct of self-regulation was therefore picked as differences in self-regulation skills can influence this cognitive reappraisal. These differences influence levels of rumination, which plays an important role in the development of PTSS, depression, and increases the risk of SI (Brewin & Holmes, 2003; Dhingra et al., 2016; Vohs & Baumeister, 2004). Self-regulation skills have been found to be an important

determinant in the recovery from PTEs: Individuals with higher levels of self-regulation skills were found to appraise threats as less harmful, which resulted in less intense emotional responses and rumination (Benight & Bandura, 2004; Smith et al., 2015). Furthermore, the IMV model of suicide posits that the experience of defeat is key in the shift to SI or suicide, however, higher self-regulation skills have been linked to decreased attempted suicidal behaviours (Malouf et al., 2014).

3.6. Conclusion

It remains unclear what impacts the addition of the purple calls has had on the mental health of NZ firefighters. While there is some NZ literature examining the mental health of first responders, this is still in an emerging stage. Furthermore, while grey literature considered the impact of attending traumatic calls on the mental health of firefighters and actions in two qualitative studies developed for FENZ to support firefighters' wellbeing (Adams et al., 2018; Darby, 2019), the presence of PTSS, depression, and suicidality has not yet been empirically investigated. In summary, it appears there is a paucity of research on mental health in NZ first responders to start with, and even more so specific research on the presence of PTSS, depression, and suicidality in NZ firefighters. Furthermore, literature has called for future studies to concentrate on systematically investigating the putative mechanisms of suicidality in PTSS including the role of particular PTSS symptoms, comorbid major depression, feelings of hopelessness, levels of social support, and negative dysfunctional appraisals (Panagioti et al., 2012). The current study aims to address this gap in literature.

As it is the first study of this kind in New Zealand, combined with talks with the industry and the increased media attention in the time this study was undertaken, the question arose what the levels of SI in firefighters in New Zealand was. Considering the shown effects of

PTSS and depression on SI, and the irreversible nature of suicide, the decision was made to complete a scoping review of the precursors to SI in firefighters.

CHAPTER 4: MANUSCRIPT I: PRECURSORS TO SUICIDAL IDEATION IN FIREFIGHTERS: A SCOPING REVIEW

4.1. Abstract

Suicide in firefighters has been described as a firefighter's silent killer (Antonellis & Thompson, 2009), but the precursors to suicidal ideation and suicide has received little attention. In the present study, literature in the emergency services and suicidality field was examined, themes pertaining to the precursors of suicidal ideation and suicide were identified, informing where more research was needed to fill the gaps. Arksey and O'Malley's (2005) framework was used for this scoping review. Six themes emerged in the precursors of suicidal ideation and suicide in firefighters: (1) mental health; (2) physical health; (3) demographic variables; (4) occupational variables; (5) history; and (6) external factors. Protective factors showed only three themes: (1) demographic/occupational variables; (2) internal factors; and (3) treatment. In conclusion, the review offers several recommendations on how to advance research on suicidal ideation in firefighters.

Keywords: Emergency services, firefighters, suicidal ideation, suicide, New Zealand, scoping review

Growing evidence has suggested that there is an elevated rate of suicidal ideation (SI) and suicide in high-risk occupations. This is particularly the case for firefighters, as the nature of the job puts them at risk of exposure to chronic stress and potentially traumatic events (PTEs), such as natural disasters, suicide (attempts) and car accidents (Bartlett, Smith, et al., 2018). Efforts to understand the precursors to suicide are vital to understand in an attempt to prevent suicide in the profession of firefighters. For the purposes of this study, the word precursors will be used for conditions that have been found to precede SI.

Many firefighters experience mental health difficulties, SI or die by suicide (Stanley et al., 2015), yet most studies in this field focus on firefighters in the United States (e.g., Martin, Vujanovic, et al., 2017; Noor et al., 2019; Stanley, Hom, et al., 2017b). It has been suggested that while fear of death is a normal and beneficial part of life, becoming used to seeing death, may decrease the fear of the pain and eliminate a barrier to suicide (Joiner, 2010). In response to repeated exposure to PTEs, a habituation to death process occurs, resulting in the emergence of the capability for suicide. As a firefighter's job by nature exposes them to death or severe injuries, this elevated exposure to PTEs may lead to increased SI and to a decreased barrier to suicide.

4.2. Research Purpose

The purpose of this paper was to conduct a scoping review of the state of the existing literature on the precursors to SI and suicide in firefighters to identify gaps in the literature and highlight where more research is necessary. For the current review, SI was defined as serious thoughts about taking one's own life (Lawrence et al., 2018; Van Orden et al., 2010). The term suicide is used for occasions where an individual had implicit or explicit intent to die, followed by a self-inflicted death (Silverman et al., 2007). Rates of SI are generally reported in literature as calculated over a lifetime, over the past year, precareer or during career (Carleton et al., 2018).

This paper makes two contributions to emergency services and suicidality literature. First, it provides a summary of the emergency services and suicidality relationship from a wide scope of sources. The results section of this paper presents the various precursors to SI and suicide as well as the themes that the precursors can be grouped into. The objective is to catalogue descriptively evidence-based knowledge. Second, the discussion section of this paper attempts to contribute to a greater understanding of the emergency services and

suicidality relationship, identifying gaps in the research and providing practical implications that are informed by the results of this scoping review.

4.3. Method

The analysis was conducted using the five stages of the methodological framework referred to as a 'scoping review' (Arksey & O'Malley, 2005; Colquhoun et al., 2014), to create a catalogue of major empirical findings presented in an accessible and summarised format. This method is designed to map a relatively understudied topic and compile necessary literature (Arksey & O'Malley, 2005). The scoping review framework consists of six stages: (1) identifying the research question; (2) identify relevant studies; (3) study selection; (4) data charting; (5) collating, summarizing, and reporting results; and (6) consultation (Arksey & O'Malley, 2005). It should be noted that while systematic reviews are generally guided by a highly focused research question to search for specific study designs, scoping reviews aim to identify all relevant literature regardless of the study design, resulting in a wider focused research question. As familiarity with the literature increases, researchers might refine search terms, meaning the search terms, identification of relevant studies or study selection limitations are generally tolerant at the beginning of the review. For the first step, the search, selection, and synthesizing process was guided by the research question: What is known from the existing literature about the precursors to suicidal ideation in firefighters?

4.4. Search Strategy

The second stage of the review focused on identification of all relevant studies, which involved searching different sources for research evidence, such as electronic databases, reference lists and hand-searching key journals. During this stage, decisions were made for practicality, such as limiting the time span and language of publications included in the review. A search of the literature was conducted to determine the presence of related research

in five databases: PsycINFO, MedLine, Web of Science, CINAHL and SCOPUS. Within these five databases, the following search terms were paired and searched for within article titles and abstracts: ‘firefighter’, ‘fire fighter*’ OR firemen) and suicidal ideation keywords (that is, suicidal ideation OR suicide ideation). As described above, while familiarity with the literature increased, the search term suicid* was added to the suicidal ideation keywords, to include articles using terms such as suicidality and suicide attempts. The flow chart following preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines is shown in Figure 4.1.

The third step was the selection of relevant studies. This stage included the development of exclusion and inclusion criteria, which were sharpened as familiarity with the literature increased. Inclusion criteria were articles that addressed precursors to suicidal ideation in firefighters, were published in peer-reviewed journals and written in the English language. Exclusion criteria were articles not written in English, literature reviews (such as systematic reviews) and articles where suicidal ideation was mentioned, but not the focus of the article. Titles and abstracts of 515 citations were reviewed for eligibility. After eliminating 394 duplicates and 3 articles on the basis of language, 118 articles were scanned for relevance. Fifty-six articles were excluded on grounds of the title or abstract, or because the topic was not suicidal ideation. Reference lists from the remaining 62 articles were then checked for studies that may not have been included in the computerised search results. Four additional documents were identified. The full texts of the resulting 66 articles were examined, and on further review, another 20 articles were excluded because of the content (i.e., 15 articles were literature reviews, one solely focused on other mental health issues, two focused on the validation of a measurement and two involved a brief intervention). The reference lists of the articles were also examined for titles fitting the inclusion criteria. The final 46 articles

included in this scoping review addressed the precursors of suicidal ideation in firefighters from across the world.

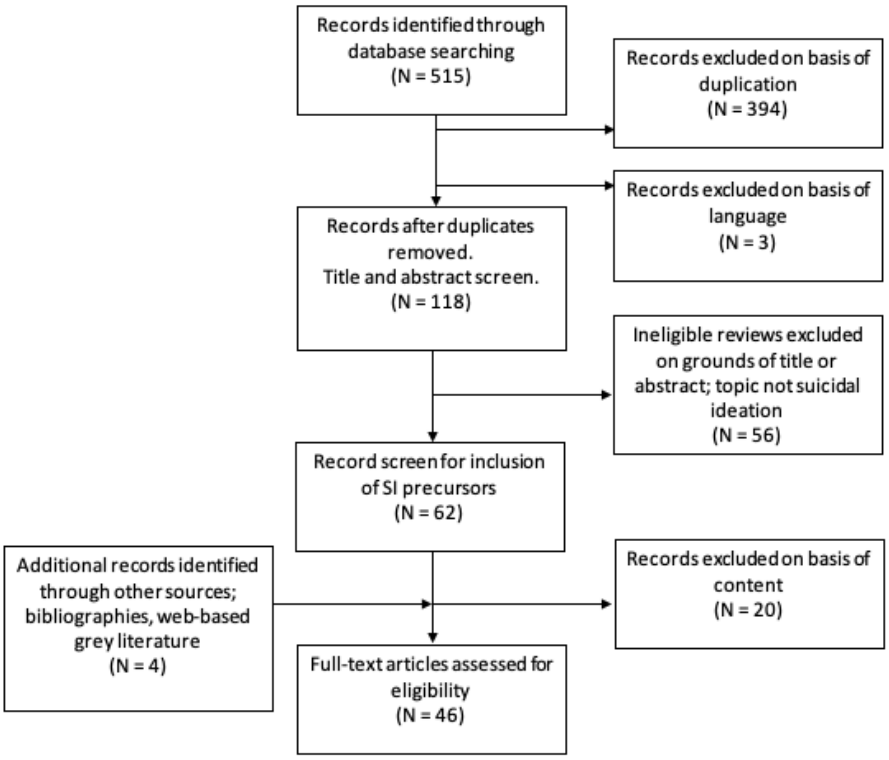

Figure 4.1. PRISMA of search strategy

At the fourth step, a total of 46 articles were extracted (see Appendix A). Extracted data included: authorship, year of publication, primary purpose of study, event and sample information, research design, suicidal ideation assessment and major suicidal ideation findings.

4.5. Results

The first four steps of the scoping review framework generated a wide variety of publications that were published between February 2010 and June 2021. Appendix A presents the final set of 46 quantitative studies that explored precursors to suicidal ideation in firefighters across the world. Most publications were written by researchers in the United

States (N = 36). In contrast, other countries had much fewer publications, with a total of 10 publications; Korea (N = 4), Canada (N = 2; and 1 combined with USA), Australia (N = 3) and Brazil (N = 1). The results showed overarching themes of mental health, physical health, demographic variables, occupational variables, history, and external factors in the precursors and demographic/occupational variables, internal factors, and treatment in the protective factors of suicidal ideation in firefighters. Congruent with the methodology, the articles were not analysed in depth (Arksey & O'Malley, 2005).

Altogether, these studies used 40 distinct samples, of which one was analysed in three articles, and three samples in two articles each. There were 9 samples of emergency services personnel, and 37 of firefighters only. Of the 37 firefighter samples, 18 included career firefighters, and 19 were mixed (e.g., career, volunteer, hybrid, military). Most of the studies (N = 41) used a sample of both male and female participants, four used female firefighters only and one used an all-male sample. The number of participants in the samples ranged from 61 to 193,152 (statistics based on all 46 studies: median = 868; mean = 8,411; standard deviation = 28,910; statistics based on 36 studies with sample sizes ranging from 61 to 9,260: median = 861; mean = 1,443; standard deviation = 2,009).

Study designs ranged from web-based self-report surveys (N = 35, 76%), self-report questionnaire alone (N = 2, 4.35%), self-report questionnaire in group setting (N = 5, 10.87%) to analysis of suicide data from national databases (N = 4, 8.70%). Suicidal ideation was measured by the following measures: the Suicide Behaviours Questionnaire-Revised (SBQ-R: 16 studies), the Self-Injurious Thoughts and Behaviours Interview-Short Form (SITBI-SF: 7 studies), both SITBI-SF and SBQ-R (3 studies), both SITBI-SF and the Depressive Symptom Inventory-Suicidality Subscale (2 studies), one suicidal ideation item from the Beck Depression Inventory (BDI: 1 study), Beck Scale for Suicide Ideation (BSS: 2

studies), one suicidal ideation item from the Patient Health Questionnaire 9 (PHQ-9: 1 study), specifically developed questions (11 studies) and not measured (3 studies).

Precursors for suicidal ideation examined under the theme of mental health were: Mental health care or treatment (3 studies), posttraumatic stress symptoms (PTSS; 20 studies), depression (9 studies), insomnia or sleep disturbance (5 studies), problematic alcohol or drug use (7 studies), perceived burdensomeness (2 studies), thwarted belongingness (3 studies), precareer or career history of suicide attempt (SA), suicidal ideation (SI) and/or suicidal behaviour (SB; 2 studies) and nondisclosure (1 study). The second theme, physical health, covered medical history of hypertension or other health problems (2 studies). The third theme of precursors under demographic variables encompassed age (2 studies), relationship status or problems (5 studies), geographical location (3 studies), sexual orientation (1 study), sex (8 studies), education (1 study), and ethnicity (2 studies).

The fourth theme of precursors, occupational variables, included public safety personnel (10 studies), years of service (3 studies), (chronic) stress/excessive emotional labour/work on life impact (7 studies), exposure to potentially traumatic events (PTEs)/cumulative trauma (10 studies), shifts of 48 hours (1 study), bullying (1 study), low meaningfulness of work (1 study), position/rank (2 studies), volunteer versus career (2 studies), and military or veteran status (3 studies). The fifth theme of precursors, history, comprised of a history of sexual and/or physical abuse (1 study), while the sixth and final theme, external factors, encompassed stigma (4 studies), anxiety sensitivity (3 studies), and the mindfulness facet of observing (2 studies).

Protective factors for suicidal ideation were comprised of three themes. The first theme, demographic and occupational variables, included years of service (1 study) and relationship status (1 study). The second theme, internal factors, encompassed distress tolerance (2

studies), social support (4 studies), resilience (1 study), self-regulation (1 study), self-forgiveness (1 study), and the mindfulness facets of acting with awareness and nonjudging of inner experiences, as well as overall mindfulness (2 studies). The third and final theme of protective factors was treatment, which covered mental health care or treatment (1 study).

4.6. Discussion

While growing evidence has suggested that people in high-risk occupations have an elevated rate of SI and suicide, the research into precursors to SI and suicide is still at an emerging stage (Stanley et al., 2016b). This scoping review mapped the published literature on precursors to SI and suicide in firefighters across the world. The objective of this paper was to explore the literature describing the relationship between emergency services and suicidality, but also to identify gaps within emergency services and suicidality focused research. To the best of the author's knowledge, this scoping review represents an initial comprehensive overview of risk and protective factors to SI and suicide in firefighters across the world. The identified papers examined precursors to SI and suicide from 2010 to 2021. Altogether, the reviewed papers describe a wide range of precursors to SI and suicide, with a decidedly lower number of protective factors examined. Table 4.1 shows a summary of the risk factors associated with SI and suicide in firefighters.

Table 4.1. Precursors for SI and suicide in firefighters

Precursors:	**Citations:**
Mental health theme:	
- Mental health care/treatment (3 studies)	(Noor et al., 2019; Roberts, 2019; Stanley, Boffa, et al., 2017)
- PTSS (20 studies)	(Bartlett, Jardin, et al., 2018a; Boffa et al., 2017, 2018; T. P. Carpenter et al., 2020; Groll et al., 2020; Healy & Vujanovic, 2021; Kim et al., 2018, 2020; Kyron, Podlogar, et al., 2020; Kyron, Rikkers, et al., 2020; Martin, Tran, et al., 2017; Martin, Vujanovic, et al., 2017; Noor et al., 2019; H. Park et al., 2019; Pennington et al., 2021; Roberts, 2019; Stanley, Boffa, et al., 2019; Stanley, Hom, et al., 2017a)

- Depression (9 studies)	(T. P. Carpenter et al., 2020; Kim et al., 2020; Martin, Tran, et al., 2017; Martin, Vujanovic, et al., 2017; Noor et al., 2019; H. Park et al., 2019; Pennington et al., 2021; Stanley, Boffa, et al., 2017; Stanley, Smith, et al., 2018)
- Insomnia/sleep disturbance (5 studies)	(Chu et al., 2017; De Barros et al., 2013; Kim et al., 2018; Kyron, McEvoy, et al., 2021; Serrano et al., 2020)
- Problematic alcohol/drug use (7 studies)	(Bing-Canar et al., 2019; Gallyer et al., 2018; Kim et al., 2018; Kyron, Rikkers, et al., 2020; Martin, Vujanovic, et al., 2017; Roberts, 2019; Stanley, Boffa, et al., 2017)
- Perceived burdensomeness (2 studies)	(Chu et al., 2016; Gallyer et al., 2018)
- Thwarted belongingness (3 studies)	(Chu et al., 2016; Gallyer et al., 2018; Stanley, Hom, et al., 2018)
- Career suicide attempt history/precareer history of SI or SB (2 studies)	(Hom et al., 2019; Stanley, Hom, et al., 2017b)
- Nondisclosure (1 study)	(Kyron, Podlogar, et al., 2020)
Physical health theme:	
- Medical history of hypertension/health problems (2 studies)	(Jones et al., 2020; Pennington et al., 2021)
Demographic variables theme:	
- Age (2 studies)	(Carleton et al., 2018; Tiesman et al., 2015)
- Relationship status/problems (5 studies)	(Carleton et al., 2018; Jones et al., 2018; Kyron, Rikkers, et al., 2020; Pennington et al., 2021; Roberts, 2019)
- Geographical location (3 studies)	(Carleton et al., 2018; Jones et al., 2020; Stanley, Hom, et al., 2018)
- Sexual orientation (1 study)	(Kyron, McEvoy, et al., 2021)
- Sex (8 studies)	(Carleton et al., 2018; Jones et al., 2020; Kyron, Rikkers, et al., 2020; Noor et al., 2019; H. Park et al., 2019; Stanley, Hom, et al., 2017b; Tiesman et al., 2015; Violanti, 2010)
- Education (1 study)	Carleton et al., 2018 (for past-year SB, not for lifetime SB)
- Ethnicity (2 studies)	(Stanley et al., 2020; Violanti, 2010)
Occupational variables theme:	
- Public safety personnel, e.g., police, army, ambulance, and firefighters (10 studies)	(Carleton et al., 2018; Groll et al., 2020; Jones et al., 2018; Kimbrel et al., 2016; Kyron, Rikkers, et al., 2020; H. Park et al., 2019; Stanley et al., 2015; Stanley, Boffa, et al., 2017; Tiesman et al., 2015; Violanti, 2010)
- Years of service (3 studies)	(Carleton et al., 2018; Kyron, Rikkers, et al., 2020; Stanley et al., 2015)
- Stress/chronic and excessive emotional labour/work on life impact/occupational stress (7 studies)	(G. S. J. Carpenter et al., 2015; Hyun et al., 2020; Kyron, Rikkers, et al., 2020; Noor et al., 2019; H. Park et al., 2018; Roberts, 2019; Stanley, Boffa, et al., 2018)

- Exposure to PTE(s) (including suicide), cumulative trauma (10 studies)	(Bing-Canar et al., 2019; Boffa et al., 2018; Groll et al., 2020; Hom et al., 2018a; Kim et al., 2018; Kimbrel et al., 2016; H. Park et al., 2019; Stanley et al., 2015, 2020; Streeb et al., 2019)
- Shifts of 48hrs+ (1 study)	(Jones et al., 2020)
- Bullying (1 study)	(Kyron, Rikkers, et al., 2020)0
- Low meaning of work (1 study)	(Kyron, Rikkers, et al., 2020)0
- Position/Rank (2 studies)	(H. Park et al., 2019; Stanley et al., 2015)
- Volunteer versus career (2 studies)	(Stanley et al., 2015; Stanley, Boffa, et al., 2017)
- Military/veteran status (3 studies)	(Bartlett, Smith, et al., 2018; Groll et al., 2020; Stanley et al., 2015)
History theme:	
- History of sexual and/or physical abuse (1 study)	(Hom, Matheny, et al., 2017)
External factors theme:	
- Stigma (4 studies)	(T. P. Carpenter et al., 2020; Hom et al., 2019; Kyron, Podlogar, et al., 2020; Kyron, Rikkers, et al., 2020)
- Anxiety sensitivity (3 studies)	(Boffa et al., 2018; Stanley, Hom, et al., 2017a; Stanley, Smith, et al., 2018)
- Mindfulness facet of observing (2 studies)	(Serrano et al., 2020; Stanley, Boffa, et al., 2019)

As expected, higher levels of mental health difficulties were linked to higher levels of SI in firefighters. Mental health care or treatment was found to be associated with higher SI (30, 33, and 35 in Appendix A). Twenty studies found that high PTSS was associated with elevated rates of SI and SA (1, 3, 4, 5, 8, 13, 22, 23, 25, 26, 27, 28, 29, 30, 31, 32, 33, 35, 37, and 42). One study examined the PTSS clusters separately and found that all were linked to elevated suicide (3). It should be noted that most of the participants of most of these studies were mostly white/Caucasian males and working in large urban areas, which means these results may not be generalizable to female firefighters, firefighters of other ethnicities, and firefighters working in rural areas. Further, studies such as Bartlett, Smith, et al. (2018) did not use any validity checks in their survey, so their results should be interpreted with caution.

Depression was linked to lifetime SI and SA (28, 29, 30, 31, 35, and 43), while self-forgiveness was found to alleviate depressive symptoms (8). Again, these studies employed mainly male dominated samples, and career firefighters, which means generalization to other samples that are comprised of higher levels of females or volunteers may be difficult. One study reported finding lower than expected rates of depression (22), but also that PTSS was associated with elevated levels of depression and SB. A strength of this study was that they used a self-report measure assessing duty-related incident, which they adapted to suit incidents Korean firefighters might encounter as well as the Korean version of the PCL-5 to assess PTSS. A further study found that firefighter decedents were less likely to have been diagnosed with depression than nonfirefighter decedents (32). The fourth risk factor found under the mental health theme was insomnia or sleep disturbance. Sleep disturbance or insomnia was associated with higher levels of SI (10, 14, 22, and 34), while the reverse was also found to be true (11). Limitations of these studies were that they relied on self-report, which may be less accurate than objectively measuring sleep disturbance through measures such as polysomnography; they used cross-sectional studies, which means temporal and causal conclusions are limited.

Problematic alcohol or other drug use was linked to elevated suicide risk (3, 12, 23, 27, 29, 30, and 33), although one study found this difference was only found in males (30). A study comparing career and volunteer firefighters found that while volunteer firefighters generally reported higher levels of psychological distress, career firefighters reported more problematic alcohol use (35). One of these studies found that elevated problematic alcohol use was significantly linked with elevated SI via perceived burdensomeness, but not thwarted belongingness in their first study; however, problematic alcohol use was linked with career SI via both perceived burdensomeness and thwarted belongingness in their second study conducted with female firefighters only (12). One limitation of this study was that the sample

consisted of career firefighters only, which is a population that has been found to have higher rates of problematic alcohol use than volunteers, while the majority of US firefighters are volunteers.

A further study examining the propositions of the interpersonal-psychological theory of suicide (IPTS) found that the three-way interaction between perceived burdensomeness, thwarted belongingness, and fearlessness about death was significantly associated with career SA (9). This interaction disappeared after accounting for years of service or age. A third study looking into perceived burdensomeness and thwarted belongingness found that a link between wildland firefighters and suicide risk could be statistically explained by thwarted belongingness, but not perceived burdensomeness (38). A history of career SA was linked to increased normalization of suicide and decreased attribution of suicide to isolation or depression, while elevated levels of suicide stigma and normalization were associated with elevated risks of future SA (16). Furthermore, a precareer history of SI or SB was linked to career SI and SB (41).

The last risk factor in the mental health theme was nondisclosure. One study examined the differences in levels of psychological distress, wellbeing and social support between participants who reported SI, those who reported no SI and nondisclosers, which were those who preferred to not answer the question (26). Nondisclosers showed elevated rates of psychological distress and PTSS, lower wellbeing and social support than participants in both other groups. Nondisclosers further reported high degrees of stigma within their workplace.

The second theme of physical health encompassed a medical history of health problems, including hypertension. One study showed that firefighter decedents were more likely to have experienced a health problem prior to death than nonfirefighters (32), while the other study found that having a medical history of hypertension increased the risk of mental health distress (21). It is possible that due to the nature of firefighting jobs, firefighters are at higher

risk of health problems, and the manner in which the information was gathered does not allow for clear interpretations of this data.

The third theme of precursors of SI examined in literature was demographic variables. First, it was found that age was inversely associated with both past-year and lifetime SB (6). The second study found that an age over 65 was a risk factor for workplace suicide (45). Social support was found to be a risk factor by five studies (6, 21, 27, 32, and 33). For example, one study found that participants who were single, separated, divorced, or widowed were more likely to report SB than those that were married or in common-law relationships (6). Two studies looking at decedents found that intimate partner problems were associated with suicide (32, 33). Geographical location was examined by three studies. The first study found that Eastern Canadians were at a higher risk of past-year SB compared to Western Canadians; however, this was not found for lifetime SB (6). The second study found that being part of a rural department instead of an urban department increased risk of mental health difficulties (21). The third study found that wildland firefighters were at a greater risk of experiencing SI than nonwildland firefighters (38). One study examining the effect of sexual orientation on mental health found that firefighters with a bi-/pansexual orientation, or who were unsure of their sexual orientation were at higher risk of experiencing SI and SP, while LGBT+ were at higher risk of lifetime SP and SA (25).

Eight studies examining the risk factor of sex found varying results; four studies found that female firefighters were at a higher risk (21, 30, 31, and 41); one found that female firefighters were at a higher risk of lifetime SB, but not for past-year SB (6); and two studies found that male firefighters were at a higher risk of SI and SB (27) and workplace suicide (45). The eighth study reported that female police officers had 12 times the suicide rate of firefighters (46); however, this study used data from an older database, which was not able to be compared to more recent data. A study examining the effect of education found that public

safety personnel with less than four years of college were at an increased risk of past-year SB compared to those with university degrees or four years of college (6). The last demographic variable examined in literature was ethnicity. One study found after controlling for years of service as firefighter, American Indian/Alaska Native (AI/AN) firefighters were 16.31 times more likely to report a career SA history than non-AI/AN firefighters (39). The second study found that ethnic minority police officers had 4.5 times the suicide rates of firefighters (46).

The fourth theme of precursors was occupational variables. The first variable of interest in this theme is public safety personnel (e.g., police, ambulance, army, and firefighters). Ten studies found that being in a high-risk occupation puts people at a higher risk of developing SI (6, 13, 21, 24, 27, 31, 35, 40, 45, and 46). Within this occupational variable, public safety personnel with prior military experience were at an even higher risk of SI (13). While one study found that longer serving emergency services personnel experiences increased risk of SI (27), a study examining firefighters specifically found that fewer years of service put firefighters at risk of elevated rates of career SI (40). A third study examining public safety personnel found no difference in past-year SB, but public safety personnel with 10 years of service or more were significantly less likely to report SB (6).

Meyer et al. (2012) found that occupational stress increased firefighters' risk of developing PTSS. The results of this scoping review showed that both general and occupational stress are also associated with higher levels of SI (7, 30, 31, 33, and 35). Furthermore, exposure to chronic and excessive emotional labour (work where expressing one's own feelings has to be managed in order to carry out one's job) was linked to higher SI risk, with some sub-scales linked to as high as double the risk (20).Work on life impact was also found to be a precursor for SI (27). Exposure to PTEs, including suicide, and cumulative trauma were found as precursors in nine studies (3, 5, 13, 19, 23, 24, 31, 39, 40, and 44). One study added that increased impact of a suicidal death was linked to more severe current

suicide risk (19). While another one of these studies used a measure for occupational stress which was developed specifically for firefighters (3), it only looked at SI as the outcome variable, neglecting to examine wider suicide behaviour such as past attempts or suicide plans. A further study found that the association between number of PTEs and SI was diminished after being adjusted for PTSS (23). Finally, a study examining the impact of cumulative trauma did not find results to support that cumulative trauma was linked to increased SI (21).

Working shifts of in excess of 48 hours (21), low meaningfulness of work (27) and bullying (27) were each also found as occupational precursors. While one study found that being an officer increased participants' risk of SI (31), another study found that lower firefighter rank was a precursor (40). Two studies examining differences between volunteer and career firefighters found that volunteer firefighters reported elevated levels of SI (35, 40). Studies found conflicting results in the final precursor in occupational variables, military/veteran status. While one study found no significant differences between a military and nonmilitary veteran firefighters (2), another study found that ex-military public safety personnel were 1.5 times more likely to report SI compared to those without prior armed forces experience (13). Both studies used the PTSD Checklist for DSM-5 (PCL-5) to measure trauma exposure. A third study found that both active-duty military status and professionally responding to a SA or death were precursors to SI; however, they did not look at the interaction between these two variables (40).

The fifth theme of precursors encompassed only one factor, history of either physical abuse or sexual abuse, or both, which was examined by one study and linked to higher career SI (15). The final theme, external factors, encompassed stigma, the mindfulness facet of observing and anxiety sensitivity. Stigma was examined in four studies and showed varying results. One study found that self-forgiveness was linked to lower self-stigma and

internalized stigma as well as lower SI (8). Important to note is that this study did not examine the interaction between self-forgiveness, stigma, and SI. The second study found that elevated levels of suicide stigma was associated with a higher risk of future SA (16). The final two studies found that high degrees of stigma in the workplace (26) as well as perceived stigma (27) were linked to increased levels of SI.

The last risk factor for suicide risk was higher anxiety sensitivity (5), with this study showing that while anxiety sensitivity cognitive concerns mediated the relationship between PTSS and suicide risk, the reverse was also true. A second study found that both global and cognitive concerns mediated the relationship between PTSS and SI (42), while a third study found that high anxiety sensitivity cognitive and social concerns amplified the effects of depressive symptoms on SI (43). As mentioned above, elevated levels of sleep disturbance were associated with elevated suicide risk, while the mindfulness facet of *observing* was found to strengthen this relationship (34). Similarly, while elevated PTSS increased suicide risk, the mindfulness facet of *observing* strengthened this relationship as well (37). These results are expected, as sleep disturbance is part of a diagnosis for PTSS (APA, 2013).

While fewer protective factors were examined, three themes encompassed what alleviated SI in firefighters. Table 4.2 shows a summary of protective factors for SI in firefighters. The first theme, demographic and occupational variables, included relationship status, where public safety personnel that were married/common-law reported lower levels of past-year and lifetime SB, and years of service, where public safety personnel with 10 years or more of service had a lower level of lifetime SB only (6). The second theme resulting from studies into protective factors was internal factors. First, higher levels of distress tolerance were associated with lower levels of SI and SA (1) as well as moderate the effects of occupational stress on SI (36). The association between stress and SI was also found to be alleviated when peer social support levels were high (7). Higher social support was also found in emergency

services personnel who reported SI compared to nondisclosing emergency services personnel (26) and higher social support was linked to lower SI (27). Lastly, social support from significant others was found to moderate the indirect effect between PTEs and the IPTS factors (44). Self-forgiveness (8), higher resilience (27) and self-regulation (44) were also associated with lower SI. The mindfulness facets of *acting with awareness* and *nonjudging of inner experiences* as well as overall mindfulness alleviated the relationship between sleep disturbances (33) as well as PTSS (37) and suicide risk. The final protective factor was treatment, as one study found that the lower structural barriers to mental health treatment accounted for the differences in mental health variables between volunteer and career firefighters (35). Lastly, two studies found that service use rates increased with severity of SI and SB, with barriers to accessing services were concerns about reputation and embarrassment in one study (17), and self-reported stigma indicated, but not found as significant barrier (18).

Table 4.1. Protective factors for SI and suicide in firefighters

Protective factors:	**Citations:**
Demographic and occupational variables theme:	
- Years of service (1 study)	(Carleton et al., 2018) (for lifetime SB, not for past-year SB)
- Relationship status (1 study)	(Carleton et al., 2018)
Internal factors theme:	
- Distress Tolerance (2 studies)	
- Social support (4 studies)	(G. S. J. Carpenter et al., 2015; Kyron, Podlogar, et al., 2020; Kyron, Rikkers, et al., 2020; Streeb et al., 2019)
- Resilience (1 study)	(Kyron, Rikkers, et al., 2020)
- Self-regulation (1 study)	(Streeb et al., 2019)
- Self-forgiveness (1 study)	(T. P. Carpenter et al., 2020)
- Mindfulness facets of acting with awareness and nonjudging of inner experiences as well as overall mindfulness (2 studies)	(Serrano et al., 2020; Stanley, Boffa, et al., 2019)
Treatment theme:	
- Mental health care/treatment (1 study)	(Stanley, Boffa, et al., 2017)

4.7. Gaps in Research

The general aim of a scoping review is to map the extent and nature of the existing state of literature on a particular topic, rather than to evaluate the quality of the individual studies; therefore, this review refrained from any quality assessments of included articles. Nevertheless, the overview of current literature enables recommendations to be offered for the improvement of emergency services and suicidality literature. The review showed a limited geographic spread of studies, with a large amount concentrated in the USA, a limited amount in Asia and none from Europe. The only studies from Australasia found in this scoping review were from Australia. No studies were conducted in NZ. Studies examining the precursors to SI and suicide in firefighters, as well as a wider sample of first responders, public safety personnel or emergency services personnel were included, but only those which specifically mentioned that the samples included firefighters.

Many studies relied on single items or self-made instruments, despite the availability of well-researched measures. While a wide range of precursors to SI and suicide were examined, few protective factors were found in the current review. Furthermore, most of the manuscripts used samples without specifying whether participants had to have experienced a specific traumatic event prior to assessment, while some used a history of sexual and/or physical abuse, exposure to a suicide death, at least one event from the Life Events Checklist for DSM-5 (LEC-5), or cumulative trauma.

The present scoping review has its limitations and shortcomings. The searches focused entirely on articles published in the English language and in academic, peer-reviewed journals and addressed precursors to SI and suicide. Special issue articles, technical reports, journalistic accounts, executive summaries, and (un)published dissertations and theses were excluded, as these are considered grey literature, and some authors suggest grey literature requires time investment, often does not contribute a substantial impact, and is often

considered inappropriate by researchers (Hartling et al., 2017). Studies examining SI and/or suicide in firefighters, but not looking at precursors were excluded as well. Nevertheless, it is hoped this review will benefit researchers in the emergency services and suicidality field as well as practitioners as it offers an overview of the precursors to SI and suicide in firefighters across the world.

4.8. Practical Implications and Recommendations

The findings from this research suggest some key practical implications and recommendations, which should be of value to practitioners and researchers in the emergency services and suicidality field. The study suggests that research and practice would benefit from paying greater attention to the mental health of firefighters from more areas around the world, and particularly from NZ, as well as to the protective factors that alleviate the effects of precursors of SI and suicide. Research and practice would also benefit from developing guidelines that build on the protective factors identified in this and future research; developing and testing interventions based on the protective factors identified; and developing and testing interventions based on the precursors identified. For example, the finding that distress tolerance moderates the link between PTSS and suicidality suggests that training programmes focused on the strengthening of distress tolerance techniques would likely be effective in the prevention of PTSS development in the firefighter population. Furthermore, the finding that self-regulation was associated with lower SI is important, as self-regulation is something that can be addressed in interventions. Therefore, this finding suggests that not only should self-regulation be addressed and strengthened in the training of recruit firefighters, but it should also be part of an ongoing training program to prevent the development of psychological distress, and in particular SI in firefighters.

4.9. Conclusion

The observed precursors to SI in firefighters encompassed demographic and occupational variables. The goal of this scoping review was to explore potential areas for intervention and prevention, as well as identify any control variables that should be included in any analyses for the current study. For example, in response to the findings of this scoping review, questions regarding gender, age, geographic location and relationship status were included in the demographic component, and questions regarding years of service, job, career versus volunteer status were included in the occupational component of the survey.

Overall, there is a pressing need for the expansion of research into the risk and protective factors to SI and suicide in firefighters, which can inform policies and interventions. While numerous risk factors have been examined previously, protective factors have received less attention. Furthermore, there is a need to expand the geographical areas of this field of research. Better knowledge on these topics will allow for the development of well-informed policies and guidelines on how to best support NZ's firefighters from developing SI.

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STATEMENT OF CONTRIBUTION
DOCTORATE WITH PUBLICATIONS/MANUSCRIPTS

We, the candidate and the candidate's Primary Supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the candidate's contribution as indicated below in the *Statement of Originality*.

Name of candidate:	Jeannette Bertram
Name/title of Primary Supervisor:	A/P Ian de Terte
In which chapter is the manuscript /published work:	Chapter 4

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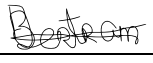
Candidate's Signature:	
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CHAPTER 5: Research Overview

This chapter will provide an overview of the research conducted in this thesis. The above discussed literature will be summarized and the rationale for the research study will be provided. The original research timeline will be detailed, followed by a discussion of the research modifications that were made. Finally, the research aims, questions and hypotheses will be outlined.

The preface backgrounded the addition of purple calls to the duties of NZ firefighters in 2014 and presented the central aim of this research, which was to investigate the influence of PTEs on the presence of PTSS, depression, and SI in a sample of NZ firefighters along with the moderation of self-regulation skills on this relationship. Subsequent chapters reviewed the literature relating to the presence of psychological distress across the world and consequently highlighted areas for further exploration. Specifically, Chapter 2 reviewed the literature on first responders and their work. Findings from studies showed that the nature of the work of first responders means they are more likely to be exposed to PTEs than the general public, leading to suggestions that first responders are at a greater risk for mental health conditions. Chapter 2 also presented an overview of the literature on PTSS, depression, and SI in general. Results from studies suggested that various factors likely play a key role in the development of PTSS, such as prior trauma, the perceived life threat during the experienced trauma, and levels of social support. Results furthermore showed that various demographic factors play a role in the development of depression, such as age, gender, and relationship status. Theories on the development of PTSS, depression, and SI were also discussed.

Chapter 3 reviewed the literature on PTSS, depression, and SI in first responders in general, and in firefighters in particular. Results from studies showed that first responders experienced a higher level of PTSS, depression, and SI than the general public. Risk factors

for symptoms after traumatic experiences included variables such as rumination, hostility, and low self-efficacy, while comorbid factors identified were factors such as problematic alcohol use and sleep disturbances. Furthermore, humour as coping mechanism and belongingness were among the protective factors identified in the results. Australian and NZ studies were discussed. Notable was the link between PTSS, depression, and the increased risk of SI. This evidence has informed the current research and its focus on PTSS, depression, and SI, in firefighters specifically.

Chapter 4 presented a scoping review of evidence regarding the precursors to SI in firefighters. While numerous risk factors have been examined, protective factors have received less attention. The review also showed that greater attention should be paid to a wider geographical area, with most studies having been conducted in the US, only two in Australia and none in NZ. Better knowledge on the subject would inform policies, guidelines, and interventions to support NZ firefighters. The current study aims to make a small step in the right direction.

In summary, the rationale for this thesis is driven by significant gaps in literature. While studies have shown an estimate of 80% of first responders being exposed to trauma and 10-15% meeting the criteria for PTSS diagnoses (Klimley et al., 2018), there is a paucity of literature examining the psychological distress of firefighters in New Zealand. While a qualitative study considered the impact of attending traumatic calls on the mental health of firefighters and actions were developed for FENZ to support firefighters' wellbeing (Adams et al., 2018), the presence of PTSS, depression, and SI has not yet been empirically investigated. These gaps in literature are addressed in the studies of this thesis.

5.1. Research Question

The overall aim of the thesis is to examine the level of PTSS, depression, and SI in a sample of NZ firefighters and how PTEs and self-regulation skills influence this presence.

Research Question. What is the level of posttraumatic stress symptoms, depression and suicidal ideation in NZ firefighters and what factors play a role in the development and improvement of these psychological injuries?

5.2. Contribution to Knowledge, Aims, and Hypothesis Development

The literature described earlier outlines there is little current knowledge of the presence of PTSS, depression, and SI in NZ firefighters, or of the influence of PTEs and differences in self-regulation skills on this presence. The current study is intended to add to the overall body of literature regarding the mental health implications of fire service membership; in particular to look specifically at the implications of membership on firefighters' mental health and certain variables that have been found to influence mental health of firefighters.

The aims and hypotheses of the current study are as follows:

Aim 1. Investigate cumulative trauma exposure and psychological distress in a sample of NZ firefighters.

A range of international studies suggest that first responders are exposed to more PTEs than the general public and in turn, the level of mental health injuries is higher in first responder populations than in the general population. Furthermore, some studies have suggested that career firefighters are at higher risk than volunteer firefighters (Wagner & O'Neill, 2012). While the trend of high levels has been confirmed in NZ studies with police, ambulance and military samples, NZ firefighter populations have not been included in this

research. Therefore, little is known about the exposure to trauma or the presence of PTSS and depression in NZ firefighters and the current study aims to complete an initial investigation of the exposure to trauma and the level of psychological distress in a sample of NZ firefighters. Furthermore, international research examining the levels of SI and the relationship with PTSS and depression has found that PTSS symptoms are associated with increased suicide risk. Comorbidity of depression has been found to compound the risk for suicide in PTSS populations. Therefore, the following hypotheses are proposed, with psychological distress encapsulating PTSS, depression, and SI:

Based on overseas literature, it is hypothesized that:

H1: PTE exposure in a sample of NZ firefighters will be higher than PTE exposure in the general population.

H2: Psychological distress in a sample of NZ firefighters will be higher than psychological distress in the general population.

H3: Psychological distress will be higher in NZ career firefighters than in volunteer firefighters.

H4: PTSS and depression will have a significant positive relationship with SI.

Aim 2. Investigate the relationship between PTEs and psychological distress in a sample of NZ firefighters.

International research on the mental health of first responders has largely neglected to examine the effect of the amount of PTEs experienced. A small number of studies that did examine the effect of cumulative PTEs found that this resulted in higher PTSS symptoms for NZ police officers and higher PTSS and depression rates in New South Wales firefighters.

Lastly, PTSS is associated with increased suicide risk. With the aforementioned being considered, the following hypothesis is proposed:

H5: Cumulative traumatic exposure will have a significant positive relationship with psychological distress.

Aim 3. Investigate whether self-regulation skills are associated with less psychological distress in a sample of NZ firefighters, and whether self-regulation skills weaken the relationship between PTEs and psychological distress.

Differences in emotion regulation have been shown to impact interpersonal functioning and well-being. Literature has shown that individuals high in self-regulation skills are less likely to experience psychological distress. While differences in self-regulation skills have been examined in various populations, little research has been conducted on the role of self-regulation skills in first responders, and in particular firefighters. Research evaluating emotions during PTEs and how individuals deal with the aftermath found that differences in self-regulation skills impact well-being. PTEs especially appear to be damaging to well-being when self-regulation skills and coping abilities are low, which in turn suggests that higher self-regulation skills alleviate the impact of PTEs on psychological well-being. Based on this past research, the following hypothesis is proposed:

H6: Self-regulation skills will moderate the relationship indicated in *H5*, such that the relationship will be weaker for those who are high in self-regulation skills.

H3 and H6 are examined in more detail in Chapter 7, the second manuscript, with particular focus on a comparison between career and volunteer firefighters. Chapter 8 presents the results for the overall sample.

This study presents a unique opportunity to answer these important questions on firefighters' mental health. The research expands the field by providing a baseline of the presence of PTSS, depression, and SI in a sample of NZ firefighters, including a comparison of career and volunteer firefighters, as well as examining the influence of PTEs and self-regulation skills on this presence. Results could provide profound information on the mental health of our nation's most trusted profession as well as on interventions needed.

5.3. Conclusion

Research on the mental health of NZ firefighters is limited. International literature has shown that the accumulative effect of traumatic experiences increases the risk of developing PTSS, in the general public, but even more so in first responder populations. PTSS in turn has been shown to be significantly associated with increased risk of suicidal ideation and suicide attempts. This effect is compounded with comorbid depression. Furthermore, research to date has found some evidence that PTEs and self-regulation skills influence the level of PTSS, depression, and SI. While there is some NZ literature examining the mental health of first responders, this is still in an emerging stage. The levels of PTSS, depression, and SI has not yet been empirically investigated. In summary, it appears there is a paucity of research on mental health in NZ firefighters as well as the variables that impact these. The current study aims to address this gap in literature.

CHAPTER 6: Methodology

6.1. Ethics

Ethical approval was obtained from the Massey University Human Ethics Committee in November 2020 (see Appendix B, Application 20/54). Although it was expected that ethical concerns would not outweigh the potential benefits for the NZ firefighter population through the knowledge generated by the study, a number of ethical decisions were made. The main ethical considerations within the current research concerned cultural appropriateness, confidentiality, psychological vulnerability, and providing participants with avenues to seek psychological help should they need it. This research was considered a difficult topic, but the costs and benefits were conceptualised and completing a topic of this nature was considered imperative.

The first significant ethical concern for the data collection study was cultural appropriateness of the survey. Supervision was sought from Māori researcher and clinical psychologist Dr. Simon Bennett, School of Psychology, as well as chairman of the local Marae and Māori volunteer operational support qualified firefighter Garry Waata. Dr Bennett raised the idea to add some personal information into the survey's information sheet (see Appendix C), such as background of the principal researcher, as well as that the principal researcher is a firefighter herself. After those changes were made, Kaumātua and QFF Waata was happy for Māori to participate in the survey. Dr Bennett also agreed to be available to discuss any cultural issues that might arise throughout data collection or analysis. In addition, Te Reo translations of the islands and regions were provided in the demographic questions. Lastly, ethnicity response options were taken from the NZ Census to ensure that they were culturally appropriate for the current population.

The second ethical consideration was to ensure that participants' responses remained confidential. Participants had the option of providing their name and contact details if they wanted to go into the draw to win a voucher or receive a summary of the research results; this was a separate data file from the survey and was not linked with their survey responses in any way. Data was stored on a password protected computer, or in a locked filing cabinet, where it will be held for a period of 5 years, after which all data will be destroyed by the primary supervisor of the principal researcher.

The final ethical consideration was the psychological vulnerability of participants due to the nature of the questions. To manage this concern, participants were forewarned that the questions might cause them some emotional distress. They were also informed that they were under no obligation to complete the survey and could withdraw at any time. Furthermore, providing participants with avenues to seek psychological help should they need it, was of high importance. Therefore, at multiple points in the survey, contact details for psychological support organizations were provided for any participant who experienced emotional distress and wanted to talk to someone about it. The organizations listed included: 1737, What's Up, Lifeline, Samaritans, Depression Helpline, Suicide Crisis Helpline, as well as FENZ Employee Assistance Programme (EAP) and peer support services. Furthermore, the header on every page of the survey gave the 1737 number, which is a free number to ring or text message, providing trained counsellors 24/7 (See Appendix D). Risk of emotional harm to the principal researcher herself was managed through supervision.

6.2. Study Design

6.2.1. Data Collection

The data collection study involved the distribution of an online survey and employed a quantitative design to investigate the presence of PTSS, depression, and SI in a sample of NZ firefighters, as well as the influence of PTEs and self-regulation skills on this presence. Rea and Parker (2014) as well as Sapsford (2007) suggested that surveys are an effective research methodology for collecting this data, as they give participants the opportunity to provide anonymous, personal, and self-reported information.

There are various advantages to choosing a survey for the study: surveys are cost and time efficient, both in developing and in data collection; they are less time intensive for participants than interviews, they allow for nationwide data collection without the need for the researcher to travel, which could potentially give a larger sample, leading to more generalizable results, and anonymity is ensured, which could encourage more self-disclosure, in particular with such a sensitive topic (Kumar, 2010; Mitchell & Jolley, 2012; Watkins et al., 2012).

6.3. Participants

Interested individuals were presented with a web-based consent form. The first three survey questions served as screening items. Individuals that reported they were older than 16, retired or current firefighters (volunteer or career) and living in NZ were able to continue with the survey. Eligible participants completed a 20-minute battery of self-report measures examining demographic and occupational characteristics; psychometric questionnaires assessing symptoms of depression, posttraumatic stress disorder and experiences with suicidal thoughts and behaviours, and a self-regulation skills questionnaire. At the end of the

survey, the participants were presented with a debrief, including national and FENZ mental health resources (e.g., 1737, depression helpline, peer support, and EAP numbers).

Finally, participants were given the opportunity to provide an email address to be entered into a draw for one of twenty gift vouchers of $40 and/or receive a summary of the results of the study once it was finished. This email address was not linked to their data. Past research using firefighters as participants has found that providing an email address, possibly divulging identifiable information, does not appear to prevent participants from being open regarding their suicidal symptoms (Hom, Stanley, & Joiner, 2016; Stanley, Hom, et al., 2017b).

Recruitment. Participants were NZ volunteer and career firefighters, both current and retired. Recruitment of these participants was done with the aid of FENZ and the United Fire Brigade Association (UFBA). Individuals were screened out when they failed to meet one of the following criteria: living in NZ; 16 years of age or older; and a current or retired firefighter. Due to the fact this study examined two independent variables, namely cumulative trauma exposure and self-regulation skills, for power of .80 and α of .05, the sample size suggested by Cohen (1992) is 30 for a large (f^2 = .35), 67 for a medium (f^2 = .15), and 481 for a small (f^2 = .02) population effect size. Based on previous research (Guilaran et al., 2018; Stanley, Boffa, et al., 2018), a medium effect size was expected. Therefore, a minimum of 67 participants was prudent and to allow for missing data elimination, the aim was to recruit at least 100 participants.

6.4. Measures[2]

Participants were asked to complete an online survey that required approximately 20 minutes to complete. The survey comprised of five sections: occupational characteristics, trauma exposure, psychological distress, self-regulation skills, and demographics. All scales used were self-report measures.

Occupational Characteristics Questionnaire. A structured, self-report occupational characteristics questionnaire was administered to all participants to assess firefighter experiences, such as years served as a firefighter and rank.

Cumulative Trauma Exposure. The Life Events Checklist for DSM-5 (LEC-5; Weathers, Blake, et al., 2013) was used to assess cumulative trauma exposure. The LEC-5 is a self-report questionnaire screening for 16 events, that are known to potentially traumatize people (e.g., "Fire or explosion"), as well as an 'other' option, experienced at any time throughout the lifespan. Participants were asked to indicate in what setting each particular event had happened, with the following options available: 1. *Happened to me*, 2. *Witnessed it happen to someone else*, 3. *Learned about it happening to a close family member or close friend*, 4. *Exposed to it as part of my job*, 5. *Not sure if it fits*, and/or 6. *It doesn't apply to me*. Participants were able to indicate multiple options for each event. Answers that it happened to the participant (option 1), that they witnessed it (option 2) and that they were exposed to it as part of their job (option 4) were coded as exposure to that traumatic event type. Those three responses across the 17 items were summed to a total number of potentially traumatic experiences. The LEC-5 is highly similar to previous LEC versions, which have been shown to be reliable and valid in a variety of samples (Gray et al., 2004). The LEC is designed as a PTE screen and not intended to establish sufficient severity to meet DSM criteria for

[2] The information presented in 6.4 is repeated in Chapter 7

traumatic exposure. The LEC-5 was administered as a prelude to the PTSD Checklist for DSM-5.

PTSS. The PTSD Checklist for DSM-5 (PCL-5; Weathers, Litz, et al., 2013) was used to assess PTSS levels**.** The PCL-5 is a 20 item self-report questionnaire using a five-point Likert scale. The PCL-5 is used to assess PTSS using the DSM-5 criteria (American Psychiatric Association, 2013). After the administration of the LEC-5, following recommendations (Weathers, Litz, et al., 2013), participants were asked to identify the event that was the most distressing for them, such that, if more than one event had happened to them, to identify the one that causes them the most current distress and describe this worst event in an open text box. They were instructed to answer the PCL-5 'keeping this worst event in mind'. Following this, participants rated the degree to which they had been bothered by that problem over the prior month on a 5-point Likert scale (0 = *Not at all*, 1 = *A little bit*, 2 = *Moderately,* 3 = *Quite a bit,* 4 = *Extremely*).

Example items included "Irritable behaviour, angry outburst, or acting aggressively" and "Feeling jumpy or easily startled". Scores were summed (range: 0-80) and higher scores indicated greater severity of PTSS. It is possible to derive four cluster scores from the PCL-5, which can map onto the DSM-5 diagnostic criteria of re-experiencing, avoidance, numbing and hyperarousal. The PCL is a widely used PTSS screener in research. A probable PTSS diagnosis is indicated by a total cut-off score of 33 or higher (Weathers, Litz, et al., 2013). Research has indicated that the PCL-5 has sound psychometric properties in order to index PTSS severity, including in samples similar to first responder populations, such as military veterans (Bovin et al., 2016; Wortmann et al., 2016). The PCL-5 has shown good internal consistency ($\alpha = .95$) in both civilian and war veteran samples (Wortmann et al., 2016).

Depression. The Patient Health Questionnaire (PHQ-9; Kroenke et al., 2001) was used to measure depression levels. The PHQ-9 is a well-validated self-report measure used to screen for depression symptoms and assess depression severity. The scale comprised of 9 items. Participants were asked to rate how often they were bothered by each problem over the past two weeks on a 4-point Likert scale (0 = Not at all, 1 = Several days, 2 = More than half the days, 3 = Nearly every day). Example items included "Little interest or pleasure in doing things" and "Feeling down, depressed or hopeless". The items were summed to obtain a total score between 0 and 27, with a score of 0-4 indicating no depression, 5-9 mild depression, 10-14 moderate depression, 15-19 moderately severe, and 20-27 severe depression. The PHQ-9 has sound psychometric properties and has been found to have excellent internal consistency with a Cronbach's alpha of .86-.89 (Kroenke et al., 2001) as well as good internal consistency in trauma-exposed samples with a Cronbach's alpha of .87-.89 (M. Park et al., 2015; Tracy et al., 2014), which is important for the current study sample.

Suicidal Ideation. The Self-Injurious Thoughts and Behaviours Interview-Short Form (SITBI-SF; Nock et al., 2007) was used to assess suicidal thoughts, suicide plans, suicide attempts and NSSI**.** The full SITBI-SF is a comprehensive measure of the nature and timing of past and current suicidal thoughts and behaviours. While originally developed as an interview measure, it has widely been used as a self-report measure (Zetterqvist et al., 2013), as well as in web-based surveys for firefighters (Stanley et al., 2015; Stanley, Hom, et al., 2017b). The current study used the SITBI-SF, containing four single-item questions from the full SITBI. This has been done in large-scale epidemiological studies of SI in a U.S. general population study by Kessler et al. (2005) and in the field of interest (Stanley et al., 2015; Stanley, Hom, et al., 2017b). Given that these are four single-item questions, no Cronbach's alpha was derivable for the current study; however, the full SITBI-SF has been found to have

strong interrater reliability (average κ = .99, r = 1.0), test-retest reliability (average κ = .70), and concurrent validity with other measures of SI (average κ = .54; Nock et al., 2007).

Self-Regulation. The Brief Self-Control Scale (BSCS; Tangney et al., 2004)**.** The BSCS is a 13-item self-report questionnaire of general self-control. The BSCS examines processes directly involving self-control. Participants rated the extent to which they felt the statements reflect how they typically are on a 5-point Likert scale, where 1 equals *Not at all* and 5 equals *Very Much*. Example items included "I say inappropriate things" (Reverse coded) and "I refuse things that are bad for me". The scores of nine items were reverse coded, after which a total score was calculated by summing the scores, with higher scores indicating higher self-regulation skills. The BSCS has shown high internal consistency (α = .85) and test-retest reliability (α = .89) among college students and community samples (Malouf et al., 2014; Tangney et al., 2004).

Demographic Questionnaire. A structured, self-report demographics questionnaire was administered to all participants to assess sociodemographic characteristics, such as age, ethnicity, and education.

6.5. Pilot Study

The survey comprised of 81 items and is included in Appendix D. The survey was pilot tested and reviewed by a small cohort, including colleagues of the researcher, a Māori advisor and firefighter. Pilot study feedback indicated that while the questionnaire was comprehensive, the time it took to complete ranged between 12 to 20 minutes. A halfway message had been inserted reading: "You have completed half the survey – thank you so much ☺ - There are about 10 minutes to go!" Pilot study feedback indicated that this was very well received. Following feedback of the pilot study, the survey was modified to include more Te Reo translations, some minor grammatical and flow issues were addressed, and

amendments were made to certain answer options. No changes were made to the standardized measures.

6.6. Methods Considerations

6.6.1. Rate and Presence of Symptoms

The original proposal of the current research project used the word prevalence. After robust discussion with the confirmation panel, the decision was made to instead use the wording "presence of symptoms in a sample of NZ firefighters". The definition of prevalence is the quantity of people in a population experiencing symptoms or having received a diagnosis (Noordzij et al., 2010). Due to the scope of the current research project, a sample within the entire population of NZ firefighters was accessed, therefore by definition the resulting numbers cannot be discussed as prevalence. The current study should be seen as a pilot study to get a rough idea of the presence of symptoms in a sample of NZ firefighters, while future research of the entire population is needed to examine prevalence.

6.6.2. Access to Career Firefighters

FENZ. Initial contact regarding the current study with Fire and Emergency New Zealand (FENZ) was made on the 7th of December 2020. After several emails and phone calls, as well as a video conference with a brief research presentation, FENZ expressed interest as well as the willingness to distribute the invitation to participate in the survey to a database of current and retired firefighters.

UFBA. Initial contact regarding the current study with the United Fire Brigade Association (UFBA) was made on the 7th of January 2021. After several emails and phone calls, the UFBA wrote a letter of support for the research study and agreed to share the

invitation to the survey with their members, both through their website and their newsletter (See Appendix E).

NZPFU. Initial contact regarding the current study with the New Zealand Professional Firefighters Union (NZPFU) was made on the 19th of January 2021. Emails, phone calls, and other correspondence during the following six months were not returned. The decision was made to go ahead with the survey, to be able to finish the research project by the end of 2021. Consideration has to be given to the fact that the inability to ask NZPFU to share the invitation with their members may mean a certain portion of firefighters were not surveyed. Respondent numbers of career firefighters show that this was not the case. It is likely that career firefighters were reached through the many other channels used to spread the invitation to the survey.

6.7. Statistical Analyses[3]

The quantitative data was analysed using the Statistical Package for the Social Sciences (SPSS) version 27 for Windows (IBM Corp., 2020). Descriptive statistics were utilized to describe the sample's demographic and occupational characteristics as well as the presence of PTSS, depression, and SI. Participants' scores on psychometric measures were scored and interpreted in accordance with procedures outlined in their corresponding manuals. Bivariate and point-serial correlations were used to examine the predicted relationships between variables. Hierarchical regression models were conducted to assess associations between sociodemographic covariates and PTSS, depression, and SI. The moderation of self-regulation on the relationship between cumulative trauma and presence of PTSS, depression, and SI was examined using an online computer program (Jose, 2013).

[3] The information presented in 6.7 is repeated in Chapter 7

CHAPTER 7: MANUSCRIPT II: TRAUMA EXPOSURE, POSTTRAUMATIC STRESS SYMPTOMS, AND SELF-REGULATION IN A SAMPLE OF NEW ZEALAND FIREFIGHTERS

Abstract

Objective: International research has found that emergency workers are exposed to elevated rates of PTEs and often suffer from higher levels of psychological distress than the general public. There is limited published data available on the levels of psychological distress in NZ firefighters as well as on factors impacting the development of psychological distress. The current research aimed to examine the relationship between trauma exposure and psychological distress, as well as the impact of self-regulation skills on this relationship in a sample of NZ firefighters. **Method:** Participants were 207 Fire and Emergency New Zealand (FENZ) firefighters, split into 88 career firefighters and 119 volunteer firefighters across both the North and South Island. This study employed a cross-sectional, correlational design with a combination of self-selection and random sampling. **Results:** Results found that career FENZ firefighters reported significantly more cumulative trauma exposure than volunteer firefighters, and NZ firefighters overall reported double the trauma exposure of the general public. Furthermore, correlational analyses showed significant correlations between psychological distress and various occupational and demographic characteristics. Lastly, moderation analyses showed firefighters with higher self-regulation skills experience lower levels of psychological distress after cumulative trauma exposure and firefighters with lower self-regulation skills experienced greater consequences of cumulative trauma exposure. **Conclusions:** Self-regulation skills showed moderation tendencies on the relationship between cumulative trauma exposure and psychological distress, indicating that prevention or

treatment interventions may be most effective by targeting self-regulation skills in firefighters.

Keywords: Emergency services, firefighters, psychological distress, trauma, self-regulation, New Zealand.

What is already known about this topic:

- International research has shown that psychological distress is more prevalent in firefighters than in the general population
- PTEs increase the level of psychological distress
- PTEs can be particularly damaging to individuals' wellbeing when self-regulation skills are low

What this paper adds:

- The level of psychological distress in NZ firefighters
- The impact of PTEs on psychological distress in NZ firefighters
- The role of self-regulation skills in the development of psychological distress in NZ firefighters
- Differences between NZ career and volunteer firefighters

International research has shown that psychological distress is more frequent in firefighters than in the general population. It is widely accepted that they are at higher risk of potentially traumatic event (PTE) exposure. Due to the nature of their work, firefighters are therefore more susceptible to the consequences of cumulative traumatic exposure (Pennington et al., 2018). This paper presents data collected in 2021 from career and volunteer Fire and Emergency New Zealand (FENZ) employees regarding PTE exposure, psychological distress, and self-regulation skills. The term self-regulation skills refers to the individual regulating processes or modifying one's own responses and internal states and replacing it with a different, preferred response (Baumeister et al., 2007).

Psychological Distress

Results from studies have shown that firefighters are more prone to experiencing psychological distress, particularly posttraumatic stress symptoms (PTSS), depression, and

suicidal ideation (SI), than the general public (e.g., Haugen et al., 2012). Various key factors have been shown to play a key role in the development of symptoms after experiencing PTEs, such as prior trauma, the perceived threat of life during the PTE, levels of social support, rumination, hostility, and low self-efficacy (Bryant & Guthrie, 2005; Heinrichs et al., 2005; Regehr et al., 2000). Further, factors identified as often occurring alongside these issues are problematic alcohol use and sleep disturbances (Haddock et al., 2012; Haslam & Mallon, 2003; McFarlane, 1998), which can be circular as sleep disturbances are also part of a PTSS diagnosis. Protective factors that have been identified are humour as coping mechanism and belongingness, which is a form of social support (Sliter et al., 2014; Stanley, Hom, et al., 2019). Some studies have estimated that 80% of first responders are exposed to PTEs, while 10-15% of first responders have been found to meet the criteria for PTSS diagnosis (Klimley et al., 2018). However, there is a surprisingly limited amount of literature, with significant portions of literature focusing on victims of trauma, as opposed to first responders responding to these PTEs.

Systematic reviews have found that PTSS treatment is largely based on research on PTSS in veterans, with only three of the seventeen studies including firefighters in their participants (Haugen et al., 2012). Scientific evidence has established (e.g., Jones, 2017) that career firefighters often experience higher levels psychological distress than volunteer firefighters, which can lead to suicide. For example, Dean et al. (2003) found that career firefighters experienced higher exposure to PTEs, which in turn was related to significantly higher rates of PTSS than in volunteer firefighters. Stanley, Boffa et al. (2017) found no differences between volunteers and career firefighters in SI or NSSI.

Studies within NZ have examined the consequences of PTEs on police officers (de Terte, 2012; Stephens & Miller, 1998; Surgenor et al., 2015), ambulance personnel (Reti et al.,

2022), lifeguards (Rooke & de Terte, 2020), and first responders (Shepherd et al., 2017). This last study included eight firefighters (out of 138 front line workers). While two reports considered the impact of attending traumatic calls on the mental health of firefighters, and actions were developed for FENZ to support firefighters' wellbeing (Adams et al., 2018; Darby, 2019), PTSS, depression, and SI in NZ firefighters has not yet been empirically investigated. The research described up until this point has informed the current research and its focus on PTSS, depression, and SI, in NZ firefighters specifically.

Hypothesis Development

The literature described up until this point has suggested that first responders are exposed to more PTEs than the general population, and in turn, the level of psychological distress, which encompasses PTSS, depression, and SI, is higher in first responder populations than in the general population (e.g., Haugen et al., 2012; Henderson et al., 2016; Klimley et al., 2018). Bearing in mind that individuals do experience PTEs without developing psychological distress (Huang et al., 2019). Further, a small number of studies examining the effect of cumulative PTEs found that this resulted in higher psychological distress in first responders (e.g., Klimley et al., 2018). Furthermore, some studies have suggested that career firefighters are at higher risk than volunteer firefighters (Jones, 2017). While the trend of high levels has been confirmed in New Zealand studies with police, ambulance and military samples, New Zealand firefighter populations have not been included in this research. Therefore, little is known about the presence of PTSS, depression, and SI in New Zealand firefighters and the current study aims to complete an initial investigation of this presence in a sample of NZ firefighters. Based on overseas literature, it is hypothesized that:

Hypothesis 1: Cumulative traumatic exposure will have a significant positive relationship with psychological distress.

Hypothesis 2: Psychological distress will be higher in NZ career firefighters than in NZ volunteer firefighters.

Furthermore, when self-regulation skills and coping abilities are low, PTEs have been found to be particularly damaging to individuals' wellbeing (Baumann et al., 2005). Differences in emotion regulation have been shown to impact interpersonal functioning and well-being. While differences in self-regulation skills have been examined in various populations, little research has been conducted on the role of self-regulation skills in firefighters. Research evaluating emotions during PTEs and how individuals deal with the aftermath found that differences in self-regulation skills impact well-being (e.g., Benight & Bandura, 2004; A. J. Smith et al., 2015). On the basis of this past research, the following hypothesis is proposed:

Hypothesis 3: Self-regulation skills will moderate the relationship between cumulative traumatic exposure and psychological distress for both NZ career and volunteer firefighters.

Method

Participants

Participants were NZ volunteer and career firefighters, both current and retired. Recruitment of these participants was done with the aid of FENZ and the United Fire Brigade Association (UFBA). Participation was anonymous and voluntary, and participants could stop at any time during the survey. Individuals were screened out when they failed to meet one of the following criteria: living in NZ; 16 years of age or older; and a current or retired firefighter. Of the 220 participants from the original study, 13 responses were missing for the career or volunteer question and were removed from this part of the project. The sample

contains the responses of 88 career firefighters and 119 volunteer firefighters, for a total of 207 participants.

Most participants were current firefighters (88.2% for volunteers and 81.8% for career firefighters) and ranked senior firefighter (31% for volunteer and 34% for career). Other ranks included (Assistant) Area Manager, Fire Investigator and Rural Crew Leader. The average length of service in current firefighters was 16.9 years. Most were based in an urban location (86.6% for volunteers and 93.2% for career) and their brigade attends for volunteers on average 0 - 5 calls a week (65.5%) and for career firefighters on average more than 25 calls a week (42%). Table 1 portrays the sample characteristics for both volunteer and career firefighters.

Table 1. Occupational characteristics

	Volunteer firefighters (N = 119)		Career firefighters (N = 88)	
	N	%	N	%
Current firefighter	109	88.2	72	81.8
Retired firefighter	14	11.8	16	18.2
Rank				
Operational support firefighter	8	6.7	2	2.3
Recruit firefighter and other	3	2.5	6	6.8
Firefighter	14	11.8	2	2.3
Qualified firefighter	22	18.5	9	10.2
Senior firefighter	31	26.1	34	38.6
Station officer	24	20.2	25	28.4
Senior station officer	5	4.2	8	9.1
Deputy chief fire officer	9	7.6	1	1.1
Chief fire officer	3	2.5	1	1.1
Years of service				
0-5	28	23.5	9	10.2
6-10	22	18.5	10	11.4
11-15	11	9.2	6	6.8
16-20	17	14.3	11	12.5
21-25	12	10.1	3	3.4
26-30	3	2.5	9	10.2
31-35	6	5	11	12.5
36+	5	4.2	9	10.2
Geographical location				
Urban	103	86.6	82	93.2
Rural	12	10.1	2	2.3
Other	2	1.7	4	4.5
Average calls a week				
0-5	78	65.5	2	2.3
6-10	33	27.7	8	9.1
11-15	4	3.4	17	19.3
16-20	1	.8	18	20.5

21-25	0	0	4	4.5
More than 25	3	2.5	37	42

As shown in Table 2, the participants were mostly male (76.5% for volunteers and 96.6% for career), European/Pākehā (81.5% for volunteers and 77.3% for career), aged from 19 to 89 years old (M = 45, SD = 13.89 for volunteers and M = 49.6, SD = 14.16 for career). Six people did not answer the ethnicity question. Most were in an emergency services occupation (29.4% for volunteers and 89.8% for career). Seven people did not answer this question. In NZ, most career firefighters will do shifts of, for example, two days and two nights, followed by four days off. Therefore, career firefighters may have other jobs besides their firefighter career, which accounts for the 10.2% that did not answer emergency services as their occupation.

Most participants had an education level of skilled trade apprenticeship (30.3% for volunteers and 34.1% for career). Most were married/cohabiting (61.3% for volunteers and 69.3 for career) and lived in the North Island (75.6% for volunteers and 81.8% for career), with most of these participants living in the Wellington region (24.4% for volunteers and 23.9% for career).

Table 2. Demographic characteristics

	Volunteer firefighters		Career firefighters		Group difference
	N	%	N	%	
Gender					$U = 4181, z = -4.005, p = < .001$
Male	91	76.5	85	96.6	
Female	27	22.7	3	3.4	
Age					$t(205) = -2.339, p = .02$
Mean Yrs (SD)	45	(13.89)	49.6	(14.16)	
Occupation					$U = 1726, z = -8.646, p = < .001$
Emergency Services	35	29.4	79	89.8	
Manager	15	12.6	0	0	
Professional	21	17.6	3	3.4	
Technician/Trade worker	20	16.8	2	2.3	
Community and personal service worker	6	5	0	0	
Machinery operator/Driver	6	5	0	0	
Labourer	2	1.7	0	0	

Highest level of education					$U = 5176, z = -.145, p = .884$
Up to Year 13	19	16	14	15.9	
Year 13	30	25.2	22	25	
Skilled trade apprenticeship	36	30.3	30	34.1	
Bachelor's degree	28	23.5	16	18.2	
Honour's/Master's/Doctoral degree	6	5.1	6	6.7	
Marital status					$U = 4757, z = -1.323, p = .186$
Single	17	14.3	6	6.8	
In a relationship	20	16.8	14	15.9	
Married/Cohabiting	73	61.3	61	69.3	
Divorced/Separated/Widowed	9	7.5	7	7.9	
People in household					$U = 5180, z = -.135, p = .892$
1	14	11.8	8	9.1	
2	39	32.8	31	35.2	
3	21	17.6	19	21.6	
4	22	18.5	16	18.2	
5	17	14.3	9	10.2	
6	3	2.5	3	3.4	
More than 6	3	2.5	2	2.3	
Ethnicity					$U = 4803, z = -.521, p = .602$
Māori/Pacific Peoples	10	8.4	8	9.1	
European/Pākehā	97	81.5	68	77.3	
Other	8	6.7	10	11.3	
North Island/Te Ika-a-Māui					$U = 2828, z = -.693, p = .489$
Auckland/Tāmaki-makau-rau	20	16.8	18	20.5	
Waikato	8	6.7	4	4.5	
Bay of Plenty/Te Moana-a-Toi	7	5.9	12	13.6	
Hawke's Bay/Te Matau-a-Māui	4	3.4	4	4.5	
Gisborne/Te Tai Rāwhiti/Taranaki	4	3.4	5	5.6	
Manawatū-Whanganui	13	10.9	7	8	
Wellington/Te Whanga-nui-a-Tara	29	24.4	21	23.9	
South Island/Te Waipounamu					$U = 214.500, z = -.083, p = .934$
Tasman/Te Tai-o-Aorere to West Coast/Te Tai Poutini	4	3.3	0	0	
Canterbury/Waitaha	14	11.8	11	12.5	
Otago/Ōtākou to Southland/Murihiku	11	9.2	4	4.5	

Measures

Participants were asked to complete an online survey that took approximately 20 minutes to complete. The survey comprised of five sections: occupational characteristics, trauma exposure, psychological distress, self-regulation skills, and demographics. All scales used were self-report measures.

Occupational Characteristics Questionnaire. A structured, self-report occupational characteristics questionnaire was administered to all participants to assess firefighter experiences, such as years served as a firefighter and rank.

Cumulative Trauma Exposure. The Life Events Checklist for DSM-5 (LEC-5; Weathers, Blake, et al., 2013) was used to assess cumulative trauma exposure. The LEC-5 is a self-report questionnaire screening for 16 events, that are known to potentially traumatize people (e.g., "Fire or explosion"), as well as an 'other' option, experienced at any time throughout the lifespan. Participants were asked to indicate in what setting each particular event had happened, with the following options available: 1. *Happened to me*, 2. *Witnessed it happen to someone else*, 3. *Learned about it happening to a close family member or close friend*, 4. *Exposed to it as part of my job*, 5. *Not sure if it fits*, and/or 6. *It doesn't apply to me*. Participants were able to indicate multiple options for each event. Answers that it happened to the participant (option 1), that they witnessed it (option 2) and that they were exposed to it as part of their job (option 4) were coded as exposure to that traumatic event type. Those three responses across the 17 items were summed to a total number of potentially traumatic experiences. The LEC-5 is highly similar to previous LEC versions, which have been shown to be reliable and valid in a variety of samples (Gray et al., 2004). The LEC is designed as a PTE screen and not intended to establish sufficient severity to meet DSM criteria for traumatic exposure. The LEC-5 was administered as a prelude to the PTSD Checklist for DSM-5.

PTSS. The PTSD Checklist for DSM-5 (PCL-5; Weathers, Litz, et al., 2013) was used to assess PTSS levels**.** The PCL-5 is a 20 item self-report questionnaire using a five-point Likert scale. The PCL-5 is used to assess PTSS using the DSM-5 criteria (American Psychiatric Association, 2013). After the administration of the LEC-5 (Weathers, Litz, et al., 2013),

participants were asked to identify the event that was the most distressing for them, such that, if more than one event had happened to them, to identify the one that causes them the most current distress and describe this worst event in an open text box. They were instructed to answer the PCL-5 'keeping this worst event in mind'. Following this, participants rated the degree to which they had been bothered by that problem over the prior month on a 5-point Likert scale (0 = *Not at all*, 1 = *A little bit*, 2 = *Moderately,* 3 = *Quite a bit,* 4 = *Extremely*).

Example items included "Irritable behaviour, angry outburst, or acting aggressively" and "Feeling jumpy or easily startled". Scores were summed (range: 0-80) and higher scores indicated greater severity of PTSS. It is possible to derive four cluster scores from the PCL-5, which can map onto the DSM-5 diagnostic criteria of re-experiencing, avoidance, numbing and hyperarousal. The PCL is a widely used PTSS screener in research. A probable PTSS diagnosis is indicated by a total cut-off score of 33 or higher (Weathers, Litz, et al., 2013). Research has indicated that the PCL-5 has sound psychometric properties in order to index PTSS severity, including in samples similar to first responder populations, such as military veterans (Bovin et al., 2016; Wortmann et al., 2016). The PCL-5 has shown good internal consistency ($\alpha = .95$) in both civilian and war veteran samples (Wortmann et al., 2016). The Cronbach's alpha for this scale in this research was $\alpha = .95$.

Depression. The Patient Health Questionnaire (PHQ-9; Kroenke et al., 2001) was used to measure depression levels. The PHQ-9 is a well-validated self-report measure used to screen for depression symptoms and assess depression severity. The scale is comprised of 9 items. Participants were asked to rate how often they were bothered by each problem over the past two weeks on a 4-point Likert scale (0 = Not at all, 1 = Several days, 2 = More than half the days, 3 = Nearly every day). Example items included "Little interest or pleasure in doing things" and "Feeling down, depressed or hopeless". The items were summed to obtain a total

score between 0 and 27, with a score of 0-4 indicating no depression, 5-9 mild depression, 10-14 moderate depression, 15-19 moderately severe, and 20-27 severe depression. The PHQ-9 has sound psychometric properties and has been found to have excellent internal consistency (α =.86-.89; Kroenke et al., 2001) as well as good internal consistency in trauma-exposed samples (α =.87-.89; M. Park et al., 2015; Tracy et al., 2014), which is important for the current study sample. The Cronbach's alpha in this research was α = .91.

Suicidal Ideation. The Self-Injurious Thoughts and Behaviours Interview-Short Form (SITBI-SF; Nock et al., 2007) was used to assess suicidal thoughts, suicide plans, suicide attempts and NSSI**.** The full SITBI-SF is a comprehensive measure of the nature and timing of past and current suicidal thoughts and behaviours. While originally developed as an interview measure, it has widely been used as a self-report measure (Zetterqvist et al., 2013), as well as in web-based surveys for firefighters (Stanley et al., 2015; Stanley, Hom, et al., 2017b). The current study used the SITBI-SF, containing four single-item questions from the full SITBI. This has been done in large-scale epidemiological studies of SI in a U.S. general population study by Kessler et al. (2005) and in the field of interest (Stanley et al., 2015; Stanley, Hom, et al., 2017b). The Cronbach's alpha in this research was lower (α = .65) for the whole sample, which is expected due to this scale only having four items; however, the full SITBI-SF has been found to have strong interrater reliability (average κ = .99, r = 1.0), test-retest reliability (average κ = .70) and concurrent validity with other measures of SI (average κ = .54; Nock et al., 2007).

Self-Regulation. The Brief Self-Control Scale (BSCS; Tangney et al., 2004)**.** The BSCS is a 13-item self-report questionnaire of general self-control. The BSCS examines processes directly involving self-control. Participants rated the extent to which they felt the statements reflect how they typically are on a 5-point Likert scale, where 1 equals *Not at all* and 5 equals

Very Much. Example items included "I say inappropriate things" (Reverse coded) and "I refuse things that are bad for me". The scores of nine items were reverse coded, after which a total score was calculated by summing the scores, with higher scores indicating higher self-regulation skills. The BSCS has shown high internal consistency ($\alpha = .85$) and test-retest reliability ($\alpha = .89$) among college students and community samples (Malouf et al., 2014; Tangney et al., 2004). The Cronbach's alpha for this scale in this research was $\alpha = .84$.

Demographic Questionnaire. A structured, self-report demographics questionnaire was administered to all participants to assess sociodemographic characteristics, such as age, ethnicity, and education.

Procedure

This study employed a cross-sectional, correlational design, with a combination of self-selection and random sampling, as outlined below. The advertisement for the study was sent to the UFBA and FENZ offices. Following this, FENZ distributed the advertisement to a database of current and retired members, while the UFBA displayed the advertisement on their website and in their newsletter. Further potential participants were recruited through a snowballing method. Furthermore, the advertisement was placed on social media of Women in Fire and Emergency New Zealand (WFENZ). In the advertisement, interested parties were also offered the option of a paper survey. None of the participants opted for this option.

The current research comprises of a study involving an online survey. The survey was administered, and data collected through a secure web-based survey platform, Qualtrics. A link was created that took participants straight to the survey, which was included in advertisements for recruitment. Participants needed to have access to a computer or mobile phone with internet to complete the survey, as Qualtrics is a web-based platform. Once the

participants completed the survey, Qualtrics generated and stored the data on a secured website. Once data collection was completed, all data was transferred to the researcher's computer and stored in password-protected files.

The first page of the questionnaire fully explained the purpose of the study and informed participants of the voluntary nature of the study, explaining they may opt not to participate or to cease participation at any time. Participants remained anonymous during the study. Participants were provided with a list of services able to provide the participants with support should they require them, due to the sensitive nature of some of the questions and the potential to raise distress. This list was provided at the start and end of the survey, as well as in the block of questions on suicidal ideation. Economy of time was considered in the selection of measures in the questionnaire.

Data Analysis

The quantitative data was analysed using the Statistical Package for the Social Sciences (SPSS) version 27 for Windows (IBM Corp., 2020). Descriptive statistics were utilized to describe the sample's demographic and occupational characteristics as well as the presence of PTSS, depression, and SI. Participants' scores on psychometric measures were scored and interpreted in accordance with procedures outlined in their corresponding manuals. Bivariate and point-serial correlations were used to examine the predicted relationships between variables. Hierarchical regression models were conducted to assess associations between sociodemographic covariates and PTSS, depression, and SI. Independent samples t-test were conducted to assess the difference in psychological distress between NZ career firefighters and NZ volunteer firefighters. The moderation of self-regulation on the relationship between cumulative trauma and presence of PTSS, depression, and SI was examined using an online computer program (Jose, 2013).

Results

Cumulative Trauma Exposure. All participants had experienced at least two of the seventeen PTEs in their lifetime. The most commonly endorsed LEC-5 items for volunteers were transportation accident (86.6%), fire or explosion (83.2%), and sudden accidental death (71.4%), usually experienced as part of the job. For career firefighters, the most commonly endorsed LEC-5 item was fire or explosion (87.5%), followed by transportation accident (84.1%), and sudden accidental death (81.8%). An interesting difference between career and volunteer was exposure to toxic substances, 80.7% of career firefighters compared to 58.8% volunteer firefighters. Exposure to more than one PTE type was common; 99.2% of the volunteers and 98.9% of the career firefighters reported exposure to four or more PTE types. Career firefighters (M = 16.53, SD = 7.06) reported significantly higher levels of PTEs compared to volunteer firefighters (M = 14.45, SD = 6.05); $t(205) = 2.278$, $p = .024$.

Hypothesis 1 was tested, and results showed that as cumulative trauma exposure increased, the higher the level of psychological distress experienced by firefighters. While these results had been predicted for all measured variables of psychological distress, no significant relationships between cumulative trauma exposure and depression, suicidal ideation, suicide plans and attempts were found. The relationship was only significant for PTSS ($p = .004$) and NSSI ($p = .023$).

Hypothesis 2 was tested with independent samples t-tests for all predicted outcome variables. Contrary to expectations, volunteer firefighters did not score significantly higher than career firefighters on PTSS ($p = .527$), depression ($p = .679$), career suicidal ideation ($p = .745$), career suicide plans ($p = .873$), attempts ($p = .414$), and NSSI ($p = .396$).

Correlations for the whole sample

Bivariate and point-serial correlations were used to assess the relationship between variables for the whole sample first (Table 3). Of note for this manuscript is the correlation between cumulative trauma exposure and psychological distress in Table 3. While trauma exposure was not found to be correlated with SI, it was positively correlated with NSSI, r_{pb} = .15, $p < .05$, and PTSS, $r = .19$, $p < .01$, as well as with volunteer/career status, $r_{pb} = .16$, $p < .05$. Therefore, the bivariate and point-serial correlations were repeated separately for volunteer firefighters (Table 4), and career firefighters (Table 5).

Table 3. Bivariate and point-serial correlations between dependent and predictor variables for the whole sample

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	Suicidal Ideation	1	.46***	.27***	.34***	.08	.42***	.47***	-.35***	-.21**	.18**	.01	.02	.02	-.20**	.02	-.05	.01	-.15*	-.01	.10	-.07
2	Suicide Plans		1	.57***	.22**	.13	.26***	.27***	-.21**	-.08	.23**	.02	-.01	.01	-.11	.03	.08	-.14*	-.12	-.06	-.01	-.08
3	Suicide Attempts			1	.30***	.08	.19**	.16*	-.14*	-.09	.21**	-.05	-.06	-.07	-.07	.04	.14*	-.09	-.09	-.07	.06	-.01
4	Nonsuicidal Self-Injury				1	.15*	.22**	.21**	-.09	-.14*	.15*	-.05	.06	-.02	-.08	.06	-.05	-.05	-.14*	.01	-.03	-.10
5	Trauma Exposure					1	.19**	.13	-.08	-.09	.00	-.06	.16*	-.01	.01	.19**	-.03	-.11	-.02	-.01	.11	.01
6	PTSS						1	.77***	-.43***	-.14*	.17*	-.07	.04	-.11	.01	.07	-.02	-.09	-.19**	-.03	-.01	-.08
7	Depression							1	-.45***	-.12	.25***	-.02	-.03	-.12	-.03	.02	.01	-.10	.21**	-.05	.03	-.16*
8	Self-regulation skills								1	.16*	-.11	.01	-.07	.08	.02	.02	-.01	.17*	.14*	-.12	.06	.11
9	Age									1	-.22**	.70**	.16*	.30**	.20**	.09	-.13	.11	.42**	-.27**	-.09	.08
10	Gender										1	.31**	-.28**	-.24**	-.01	-.19**	.29**	-.16*	-.25**	.06	-.12	-.04
11	Years of service											1	.29**	.49**	.01	.15*	-.26**	-.01	.29**	-.12	-.08	.08
12	Volunteer/Career												1	.20**	-.03	.77**	-.52**	.01	.10	-.01	.07	-.06
13	Rank													1	.06	.18**	-.20**	.02	.11	-.07	-.04	.13
14	Urban/Rural														1	-.07	.03	.03	-.02	-.12	-.01	-.02
15	Weekly calls															1	-.41**	.02	.04	-.11	.01	-.05
16	Occupation																1	-.17*	-.13	.03	-.10	-.02
17	Highest level of education																	1	.13*	-.09	-.02	.10
18	Marital status																		1	.05	-.02	.02
19	Household #																			1	-.02	-.07
20	Ethnicity																				1	.01
21	North/South Island																					1

Note. PTSS = posttraumatic stress symptoms
* $p < .05$, ** $p < .01$, *** $p < .001$

A moderation analysis examines circumstances where the relationship between the independent and the dependent variable alters due to the moderating variable. In the hypothesis of this study, the independent variable was cumulative trauma exposure, and the dependent variable was psychological distress, measured in PTSS, depression, and SI. The results of hypothesis 1 show that cumulative traumatic exposure had a significant positive relationship with PTSS. Moderation analyses were performed with PTSS as the dependent variable. The moderating variable was self-regulation skills. To complete a moderation analysis, the independent and moderating variables are centered, which is achieved through subtracting each variable's mean from the observed score. Following this, an interaction term is created by multiplying these centered variables together (Howell, 2010).

Hypothesis 3 was then tested with a moderation analysis using a hierarchical multiple regression. As eight other variables significantly correlated with the dependent variables, they were included in the moderation analyses (Allison, 1999). These control variables included suicidal ideation, suicide plans, suicide attempts, NSSI, depression, age, gender, and marital status.

Moderation analysis was conducted following the process outlined in Frazier et al. (2004). At Step 1 of the multiple regression, the dependent variable was placed in the equation, and the centered independent variable as well as the control variables were added as independent variables. At Step 2, the centered moderating variable was added as an independent variable, while at Step 3, the interaction variable was added as an independent variable.

Cumulative trauma exposure significantly predicted probable PTSS, $\beta = .082$, $t(208) = 2.634$, $p = .009$. Cumulative trauma exposure also explained a significant portion of the variance in PTSS scores, R^2 of .618, $F(11, 208) = 30.562$, $p < .001$. Results showed that as cumulative trauma exposure increased, the higher the level of psychological distress

was experienced by firefighters. The interaction effects were plotted using an online computer program (Jose, 2013). The program produced a high score of one standard deviation above the mean and a low score of one standard deviation below the mean for the dependent variable of PTSS in relation to the interaction between the moderator variable self-regulation skills and the independent variable cumulative trauma exposure. The moderation interaction of the effect of cumulative trauma exposure and self-regulation on PTSS was plotted on a graph (see Figure 1). The scores for this interaction were: 10.77 (Low Cumulative Trauma and Low Self-Regulation), 9.05 (Low Cumulative Trauma and High Self-Regulation), 14.29 (High Cumulative Trauma and Low Self-Regulation), and 10.73 (High Cumulative Trauma and High Self-Regulation). Figure 1 shows that self-regulation skills moderate the cumulative trauma exposure to PTSS relationship. As was expected, the relationship between cumulative trauma exposure and PTSS was positive for both high and low self-regulation, with increased cumulative trauma exposure leading to higher levels of PTSS. However, firefighters with low self-regulation skills were much more likely to develop PTSS with increased cumulative trauma exposure, while firefighters with high self-regulation skills experienced only a small increase in PTSS with increased cumulative trauma exposure.

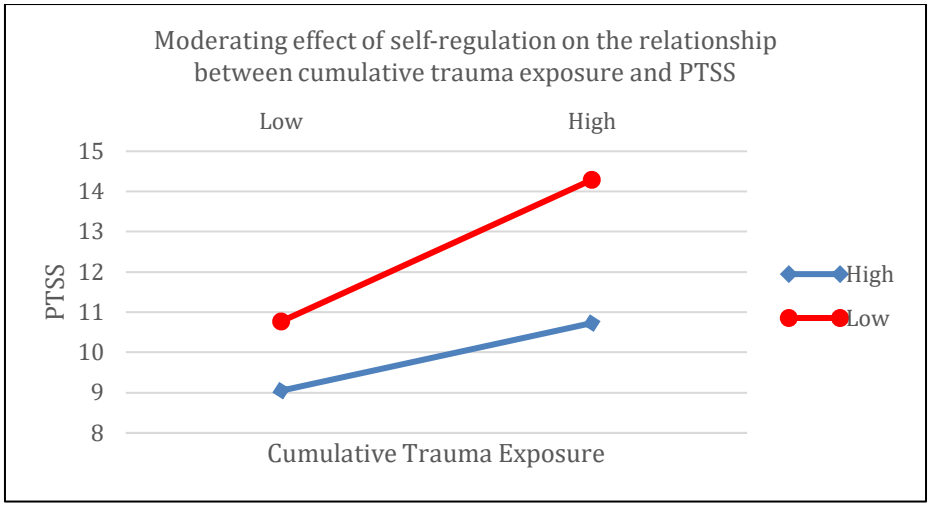

Figure 1. Moderating effect of self-regulation on the relationship between cumulative trauma exposure and PTSS

As previously mentioned, the bivariate and point-serial correlations between variables were repeated separately to assess the relationship between these variables for volunteer firefighters (Table 4) and career firefighters (Table 5). There were a number of interesting differences between volunteer and career firefighters in the correlations. First, trauma exposure was significantly correlated with suicide plans and NSSI for volunteer firefighters, but not for career firefighters, while the opposite was true for the correlation between trauma exposure and PTSS. A further interesting difference was that the volunteer results did not show significant correlations between depression and PTSS with suicide attempts or NSSI, while career firefighters did. Further, career firefighters did not show significant correlations between age, gender, marital status, and urban/rural brigade with suicidal ideation, while these correlations were significant for volunteers. Lastly, volunteer results did not show inverse correlations between self-regulation and suicide plans, while this correlation was inversely correlated for career firefighters.

Table 4. Bivariate and point-serial correlations between dependent and predictor variables for volunteer firefighters.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	Suicidal Ideation	1	.45**	.29**	.34**	.05	.40**	.46**	-.34**	-.29**	.23*	-.04	-.03	-.20*	.02	-.04	-.04	-.24*	.01	.11	.03
2	Suicide Plans		1	.60**	.41**	.22*	.18*	.25**	-.11	-.16	.29**	-.03	-.11	-.12	.19*	.09	-.15	-.17	-.09	.01	-.01
3	Suicide Attempts			1	.43**	.15	.10	.08	-.16	-.13	.18*	-.01	-.07	-.09	.14	.17	-.13	-.06	-.11	.05	.02
4	Nonsuicidal Self-Injury				1	.21*	.16	.09	-.11	-.13	.22*	-.06	-.03	-.08	.12	.01	-.15	-.08	.04	-.09	-.04
5	Trauma Exposure					1	.16	.10	-.14	-.05	.08	-.07	-.01	.05	.00	.11	-.19*	.04	-.07	.10	-.01
6	PTSS						1	.73**	-.43**	-.22*	.20*	-.23*	-.16	-.05	.08	-.01	-.09	-.30**	.04	.03	.04
7	Depression							1	-.48**	-.25**	.26**	-.14	-.18	-.10	-.02	-.01	-.11	-.34**	.07	.10	-.08
8	Self-regulation skills								1	.21*	-.12	.10	.06	.10	.08	-.08	.16	.19*	-.06	.01	-.01
9	Age									1	-.25**	.61**	.18*	.13	-.10	-.17	.17	.50**	-.16	-.04	.06
10	Gender										1	-.32**	-.24*	.01	.03	.21*	-.19*	-.25**	.12	-.13	-.05
11	Years of service											1	.47**	-.10	.06	-.21*	.08	.28**	-.07	.01	.13
12	Rank												1	-.05	.08	-.19*	-.08	.01	-.03	-.02	.07
13	Urban/Rural													1	-.17	.01	-.01	-.05	-.07	.08	-.05
14	Nr weekly calls														1	-.07	.04	-.15	-.13	-.11	.06
15	Occupation															1	-.32**	-.13	.08	-.09	-.05
16	Highest level of education																1	.12	-.09	-.06	.17
17	Marital status																	1	.07	.07	.09
18	Household nr																		1	.03	-.09
19	Ethnicity																			1	-.06
20	North/South Island																				1

Note. PTSS = posttraumatic stress symptoms

* $p < .05$, ** $p < .01$

Table 5. Bivariate and point-serial correlations between dependent and predictor variables for career firefighters.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	Suicidal Ideation	1	.47**	.26*	.32**	.12	.45**	.49**	-.33**	-.15	.13	-.04	.07	-.19	.02	-.18	.07	-.03	.01	.10	-.16
2	Suicide Plans		1	.56**	.04	.04	.37**	.35**	-.36**	.03	.14	.10	.16	-.09	-.01	-.09	-.12	-.06	.02	-.01	-.14
3	Suicide Attempts			1	.18	.01	.35**	.32**	-.11	.01	.13**	-.08	-.04	-.05	.15	-.05	-.04	-.12	-.01	.09	-.08
4	Nonsuicidal Self-Injury				1	.07	.28**	.28**	.01	-.22*	.18	-.22	-.04	-.08	.02	-.07	.07	-.21*	-.01	.01	-.13
5	Trauma Exposure					1	.23*	.20	-.02	-.17	-.03	-.22	-.03	.04	.27*	-.01	-.06	-.11	.04	.09	.08
6	PTSS						1	.83**	-.43**	-.15	.24*	-.01	-.10	.06	.10	.10	-.08	-.04	-.03	-.05	-.15
7	Depression							1	-.39**	-.06	.34**	.06	-.04	.03	.21*	.03	-.09	.02	-.13	-.05	-.20
8	Self-regulation skills								1	.16	-.20	-.01	.15	-.09	.10	.05	.19	.07	-.25*	.15	.24*
9	Age									1	-.03	.89**	.34**	.23*	-.03	.25*	.02	.33**	-.35**	-.17	.17
10	Gender										1	-.13	-.11	-.05	.07	-.05	-.16	-.21*	-.14	-.10	-.08
11	Years of service											1	.48**	.18	-.21	0.5	-.10	.33**	-.16	-.23	.08
12	Rank												1	.06	.01	-.09	.13	.27*	-.03	-.09	.20
13	Urban/Rural													1	-.06	-.06	.04	.08	-.12	-.08	-.01
14	Nr weekly calls														1	.07	-.06	-.01	-.17	-.04	-.19
15	Occupation															1	.18	.02	-.01	-.08	-.10
16	Highest level of education																1	.17	-.05	.01	.01
17	Marital status																	1	.02	-.14	-.11
18	Household nr																		1	-.09	-.08
19	Ethnicity																			1	.08
20	North/South Island																				1

Note. PTSS = posttraumatic stress symptoms

* $p < .05$, ** $p < .01$

Hypothesis 3 was then tested using the same method as previously described. Cumulative trauma exposure significantly predicted probable PTSS in career firefighters, $\beta = .076$, $t(78) = 2.399$, $p = .019$. Cumulative trauma exposure also explained a significant portion of the variance in PTSS scores in career firefighters, R^2 of .731, $F(9, 78) = 23.570$, $p < .001$. Cumulative trauma exposure significantly predicted probable PTSS in volunteer firefighters, $\beta = .093$, $t(110) = 1.993$, $p = .049$. Cumulative trauma exposure also explained a significant portion of the variance in PTSS scores in volunteer firefighters, R^2 of .551, $F(8,110) = 11.430$, $p < .001$.

The interaction effects were plotted using an online computer program (Jose, 2013). The program produced a high score of one standard deviation above the mean and a low score of one standard deviation below the mean for the dependent variable of PTSS in relation to the interaction between the moderator variable self-regulation skills and the independent variable cumulative trauma exposure. The moderation interaction of the effect of cumulative trauma exposure and self-regulation on PTSS was first plotted on a graph for career firefighters (see Figure 2 left).

The scores for this interaction for career firefighters were: 17.38 (Low Cumulative Trauma and Low Self-Regulation), 10.74 (Low Cumulative Trauma and High Self-Regulation), 17.83 (High Cumulative Trauma and Low Self-Regulation), and 15.01 (High Cumulative Trauma and High Self-Regulation). Figure 2 (left) shows that self-regulation skills moderate the cumulative trauma exposure to PTSS relationship for career firefighters. As was expected, the relationship between cumulative trauma exposure and PTSS was positive for both high and low self-regulation, with increased cumulative trauma exposure leading to higher levels of PTSS. Further, career firefighters with low self-regulation skills experienced higher PTSS levels both at low and high cumulative trauma exposure, while career firefighters with high

self-regulation skills experienced lower levels of PTSS at both low and high cumulative trauma exposure.

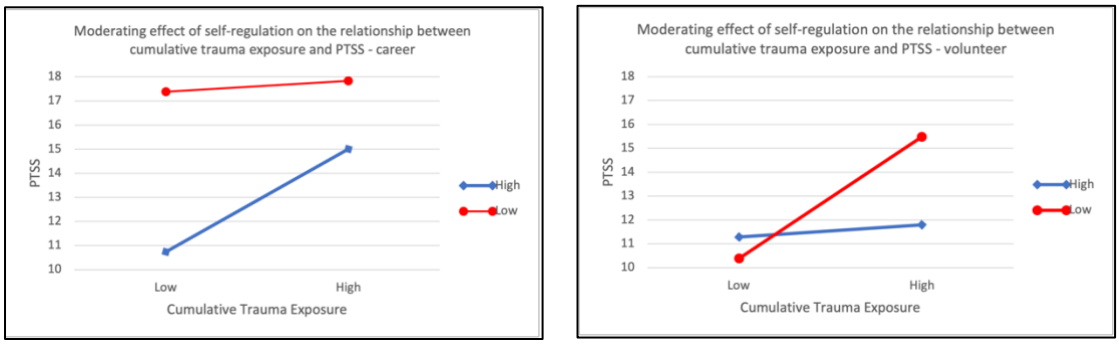

Figure 2. Moderating effect of self-regulation on the relationship between cumulative trauma exposure and PTSS for career (left) and volunteer (right) firefighters.

The moderation interaction of the effect of cumulative trauma exposure and self-regulation on PTSS was then plotted on a graph for volunteer firefighters (see Figure 2 right). The scores for this interaction for volunteer firefighters, which were established using an online computer program (Jose, 2013), were 10.39 (Low Cumulative Trauma and Low Self-Regulation), 11.28 (Low Cumulative Trauma and High Self-Regulation), 15.48 (High Cumulative Trauma and Low Self-Regulation), and 11.8 (High Cumulative Trauma and High Self-Regulation). Figure 2 (right) shows that self-regulation skills moderate the cumulative trauma exposure to PTSS relationship for volunteer firefighters. Again, as expected, the relationship between cumulative trauma exposure and PTSS was positive for both high and low self-regulation, with increased cumulative trauma exposure leading to higher levels of PTSS. However, volunteer firefighters with low self-regulation skills were much more likely to develop PTSS with increased cumulative trauma exposure, while volunteer firefighters with high self-regulation skills experienced only a small increase in PTSS with increased cumulative trauma exposure. Therefore, hypothesis 3 was supported for both career and volunteer firefighters.

Discussion

Results showed that career FENZ firefighters reported significantly more cumulative trauma exposure than volunteer firefighters, and NZ firefighters overall reported double the trauma exposure of the general public. Furthermore, significant positive correlations were found between psychological distress and various occupational and demographic characteristics, such as number of weekly calls, gender, while significant inverse correlations were found with number of people in the same household, age, and marital status for career firefighters. Significant positive correlations were found between psychological distress and age, gender, and number of weekly calls, as well as significant inverse correlations with urban/rural location, marital status, and years of service for volunteer firefighters.

Lastly, moderation analyses showed firefighters with higher self-regulation skills experience lower levels of psychological distress after cumulative trauma exposure and firefighters with lower self-regulation skills experienced greater consequences of cumulative trauma exposure. The relationship between cumulative trauma exposure and PTSS was positive for both high and low self-regulation skills for both career and volunteer firefighters, which means increased cumulative trauma exposure led to higher levels of PTSS. However, volunteer firefighters with low self-regulation skills were much more likely to develop PTSS with increased cumulative trauma exposure, while volunteer firefighters with high self-regulation skills experienced only a small increase in PTSS with increased cumulative trauma exposure. Similarly, career firefighters with low self-regulation skills experienced higher PTSS levels both at low and high cumulative trauma exposure, while career firefighters with high self-regulation skills experienced lower levels of PTSS at both low and high cumulative trauma exposure.

No significant differences were found between career and volunteer firefighters in levels of experienced psychological distress. While this is contrary to the predicted results, there are several possible reasons for this. First, recruitment and screening processes are more rigorous and systematic for career firefighters in NZ, with a three-month training at the National Training Centre. It is possible that this yields a healthier workforce than for volunteers, who may apply to their local brigade and undertake a seven-day training course after six months to one year attendance of training nights. Future research could be undertaken with assessment points prior to, during, and after a firefighting career, as has been done with similar populations, such as soldiers (Nock et al., 2014). Furthermore, the results of the current study show that career firefighters attended significantly more PTEs than volunteer firefighters.

Another possible explanation may be the sudden transition to and from civilian life that volunteer firefighters experience, as well as the higher likelihood of volunteer firefighters attending calls involving people known to them, both of which may cause the calls to be more likely traumatic, despite being lower in frequency. Volunteer firefighters, especially in larger brigades, are also more likely to attend calls with a changing compilation of crews on the truck, compared to career firefighters who often work in the same crew. The career crews spend more time with each other, are more familiar with each other and tend to have more opportunities to debrief as a crew after incidents. Lastly, career firefighters may have been more reluctant to answer honestly on the self-report questions in case of repercussions for their employment. The likelihood of this is lessened by the anonymity of the survey.

Limitations

Due to human error, in the occupational questionnaire, firefighters were asked which year they started their service for FENZ, yet firefighters that were retired were not asked which

year they retired. Therefore, the years of service could not be calculated for the 32 firefighters that were retired. Furthermore, another of the occupational characteristics questions asked how many PTEs firefighters had attended, with the options ranging from 0, 1, 2… to 10, or more than 10. In hindsight, the responses indicated it would have been better to ask in bands of 5, ranging from 0-5 and up, or even bands of 10. One of the participants' feedback showed that they attended more than 300 PTEs. While the current research used the LEC to calculate cumulative trauma exposure, future research may use a better framed question regarding PTEs alongside the LEC. Lastly, for ethical reasons, the current survey did not use forced response. Future research may consider using forced response, or multiple reminders before moving to a next page on the survey, to avoid a missing data problem.

Practical Implications and Recommendations

The knowledge provided by this research regarding the trauma exposure, psychological distress levels and self-regulation skills in career and volunteer firefighters would be of importance in the development and implementation of prevention and treatment interventions as well as supporting further research with greater attention to the identified gaps.

Firefighters in NZ experience high cumulative trauma exposure. Overall, they reported double the trauma exposure compared to the Australian general public and career firefighters experienced higher levels than volunteer firefighters. While firefighters are trained how to deal with fires and transportation accidents, less training is given on the psychological parts of the job. Better training for both career and volunteer firefighters would benefit the entire population. While career firefighters reported significantly higher cumulative trauma exposure, there was no significant difference in psychological distress levels between career and volunteer firefighters. This may mean that the particular PTEs volunteers attend lead to a

higher psychological distress than those that career firefighters attend. Future research should examine what in particular makes certain events more traumatic than others for both career and volunteer firefighters. Furthermore, future research should examine what protective factors are benefiting the career firefighters over the volunteer firefighters.

Self-regulation skills showed moderation tendencies on the relationship between cumulative trauma exposure and psychological distress, indicating that prevention or treatment interventions may be most effective by targeting self-regulation skills in firefighters. Of particular importance was the moderate significant inverse correlation between self-regulation and PTSS, depression, and SI. These results are particularly encouraging. While it may be impossible to lessen the exposure of firefighters to PTEs, it could conceivably be hypothesized that interventions aimed to increase firefighters' self-regulation skills would in turn lead to fewer or less severe consequences of cumulative trauma exposure.

Conclusion

The sample of NZ firefighters showed a significantly higher presence of PTSS, depression, and SI than the general population. In fact, the results show that one in five participants experienced some sort of distress. Further, as cumulative trauma exposure increased, so did the level of psychological distress experienced by firefighters. Career firefighters generally reported higher levels of cumulative trauma exposure than volunteer firefighters. Career and volunteer firefighters did not report significant different levels of psychological distress. Higher self-regulation skills resulted in lower levels of PTSS at both low and high levels of cumulative trauma exposure, with the exponential growth of PTSS much lower for highly self-regulated firefighters than for low self-regulation. Increased

efforts are needed to prevent and treat psychological distress in firefighters and the current study is a first step in understanding the level of psychological distress experienced in career and volunteer firefighters. The study can be used as a basis for the development and implementation of effective prevention or treatment interventions which are recommended to target self-regulation skills in firefighters.

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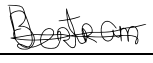
Candidate's Signature:	
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CHAPTER 8: Results for the Whole Sample

This chapter presents the results of the statistical analyses that were conducted on the data to address each of the five hypotheses of this study. First, the methods used to screen and clean up the data in preparation for the analyses will be outlined. The univariate data properties examination will be discussed. The chapter will then continue with a discussion on the statistical techniques used. The chapter will conclude with a discussion of the results of the hypothesis testing.

8.1. Preparing the Data for Analysis

Incomplete data is a common problem in social science research (Field, 2013; Little & Rubin, 1990; Pallant, 2020). Both entry errors and missing values can cause significant misrepresentations in the results, especially results obtained from analyses such as multiple regressions, which use parametric techniques. Parametric techniques produce estimations of population parameters, and parametric statistics are more powerful than nonparametric statistics (Coolican, 2009; Pallant, 2020). Parametric techniques also have more stringent assumptions about the data, as they rely heavily on statistics such as the mean and standard deviation. Entry errors and missing values impact these statistics, which can affect the reliability and validity of the results. While parametric techniques have more stringent assumptions, they can produce more significant results. The research question and methods used in the study guide whether parametric or nonparametric techniques can be used. Parametric tests are commonly used for assessing relationships between variables measured on ratio or interval scales (Pallant, 2020). Given the research question and hypotheses of the current study, parametric techniques to examine the data were considered appropriate and preferable.

8.2. Data Screening

Entry errors and missing values can occur for various reasons (Field, 2013; Pallant, 2020). Entry errors can be made by the participants when filling in the survey, or by the researcher. In the case of the current study, none of the participants opted for a paper survey, and therefore the researcher did not have to enter any of the data. Data entry errors can also be the result of software malfunctions. These kinds of errors can generate invalid responses, such as a score of 15 on a scale with a score range of 0-13. Invalid responses due to human error may be genuine mistakes, or they might be intentional, such as when participants aim to distort or hide their current self-assessed state or opinion to protect themselves against assumed negative consequences. Particularly for this study, missing values may be due to participants missing an answer in one of the longer questionnaires, such as the LEC-5, or due to the sensitivity of the topic, participants may have chosen to exert their right not to answer a question. Invalid responses may also occur when participants do not take the study seriously.

The inbuilt options of Qualtrics regarding response quality were used to ensure quality checks of data. For example, respondents were unable to complete multiple submissions. Further, responses were flagged and deleted from the final dataset if they had a poor overall completion rate. Responses with patterns of unanswered questions were also flagged and omitted from the final dataset. Lastly, respondents that straight-lined with their answers were flagged and omitted as well.

8.3. Data Clean up

Univariate statistics were generated for each of the measured variables to examine the minimum and maximum values recorded for invalid responses. Total scores for each of the scales (traumatic events, PTSS, depression, suicidal ideation, and self-regulation skills) were

calculated and screened for validity after the missing data problem had been addressed. Of the continuous variables (e.g., age, length of service), none fell outside of the possible range. Most of the demographic and occupational variables were categorical; however, each category was numbered. Thirteen participants did not answer the question whether they were career or volunteer firefighters; therefore, for certain analyses comparing career and volunteer firefighters, these 13 responses will have been omitted, in which case a different *N* will be reported. All other responses of these variables (e.g., gender, rank, and ethnicity) were valid (inspected both before and after the missing data problem was addressed).

The clean-up of data involves considering and managing any entry errors and missing values, in order to minimize their possible influence on the reliability and validity of the results. There were missing data, which was a problem that needed to be addressed. Tabachnick and Fidell (2013) suggested that the approach chosen to deal with missing data can have a dramatic effect on the results. Understanding why values were missing is a crucial step in choosing the best possible approach. Missing values generally fall in one of three categories: missing completely at random (MCAR), missing at random (MAR), or missing not at random (MNAR). MCAR means nothing systematic is going on that makes certain values more likely to be missing than other values. That is, the missing values cannot be explained by a third, unobserved variable. MAR means that there is a relationship between the missing data and the observed variables, for example, that females are more likely to answer certain questions than males. Observed variables can be used to predict the values that are missing. MNAR means missing values are explained by unobserved variables.

To examine which missing value mechanism operated in this study, Little's MCAR Test was performed. The result of this test was $X^2(17) = 25.52$, $p < .084$. The nonsignificant result suggested that data was MCAR. The result was only used as an indication, as it can mask

what is going on in the data (Enders, 2010). This is illustrated by the high percentage of responses missing for the suicidal ideation questions. A skip pattern was built into the survey tool for this section of the survey, so missing responses were expected. These responses were not missing at random (as these survey items were not relevant to all participants, and therefore not presented to those participants to whom the survey items were irrelevant), but this is not portrayed in the nonsignificant result of Little's test, which suggests items were missing at random. A further reason for cautious interpretation of Little's test is that it is possible to establish with confidence that data are not MCAR (so either MAR or MNAR); however, it is not possible to determine with certainty that data are MCAR. This is because the presence of a relationship with another variable can never be completely eliminated (Little & Rubin, 1990).

For these reasons, the missing data was also examined using other approaches. First, frequency tables and statistics portraying the percentages of values missing by item and by case were generated. The pattern in the frequency table showed that, overall, the missing values numbers increased as participants progressed through the survey. This is expected, both due to the nature of surveys and the built-in skip pattern of the survey. The response rate was higher, on average, for the PTEs experienced items than the depression, suicidal ideation, and self-regulation items.

An inspection of the values missing by case showed that 11.82% of cases had values missing, and overall, the missing values were <5%. Some items missing might be explained by a systematic mechanism for a particular case, or in other words intentional omission, yet it is a plausible assumption that the values are MCAR and were omitted accidentally. This assumption is supported by the results of Little's test and plausible due to the skip pattern and the low numbers of items missing.

Approaches considered for dealing with the missing data problem included various options for case exclusion (such as list-wise and pair-wise deletion) as well as data imputation (the simple mean, estimation-maximization, and multiple imputation). Pair-wise deletion is generally discouraged due to the resulting different sets of data, sample sizes, parameter estimates and standard errors in different analyses (Langkamp et al., 2010). Furthermore, list-wise deletion may result in a significant reduction in sample size as well as a loss of power (Tabachnick & Fidell, 2013). As the missing data in the current study was spread over 11.82% of participants, list-wise deletion would have resulted in a significant reduction of sample size. Lastly, list-wise deletion requires that the data are MCAR, to avoid introducing bias.

While Little's MCAR test was nonsignificant, it is a safer assumption that data were at least MAR as outlined. Therefore, the decision was made to impute the missing values using the estimation-maximization (EM) method. Tabachnick and Fidell (2013) suggested that data that are at least MAR and comprise of <5% of the total data set, pose only a minor threat, and all corrective procedures are likely to yield similar results. The EM method is recommended by Tabachnick and Fidell (2013) as the simplest and most reasonable imputation approach in the case of MCAR or MAR data and was therefore implemented.

Expectation-maximization is a two-step process, where the expectation step uses the existing sample parameters to estimate the missing values, based on the likelihood they would be consistent with the existing distribution of the available data, and the maximization step uses the filled in values to re-estimate the parameters. These steps are then repeated until convergence has been reached and stable estimates provided. While the EM method has been criticized as it does not entirely resolve issues with standard error, this limitation can be overcome if only small amounts of data are missing, an appropriate EM program is used and

the results are interpreted with some caution (Tabachnick & Fidell, 2013). The current study has used these precautions. Lastly, EM contains less bias of standard error than the method of Mean Substitution.

8.4. Descriptive and Background Analyses

8.4.1. Occupational Variables

As shown in Table 8.1, just over half of the 220 participants were volunteer firefighters (54.1%). Thirteen participants did not answer this question. The majority were current firefighters (85.5%) and ranked senior firefighter (31.4%). Other ranks that were mentioned included (Assistant) Area Manager, Fire Investigator and Rural Crew Leader. The average length of service among current firefighters was 16.9 years. Most were based in an urban location (88.6%). In addition, their unit attended on average 0 - 5 calls a week (38.2%). Three participants did not answer these two questions.

Table 8.1. Occupational characteristics

	N	%
Current firefighter	188	85.5
Retired firefighter	32	14.5
Volunteer	119	54.1
Career	88	40
Rank		
Operational support firefighter	10	4.5
(Recruit) Firefighter	19	8.6
Qualified firefighter	33	15
Senior firefighter	69	31.4
Station officer	51	23.2
Senior station officer	13	5.9
Deputy chief fire officer	10	4.5
Chief fire officer	7	3.2
Other	8	3.6
Years of service		
0-5	39	17.7
6-10	33	15
11-15	17	7.7
16-20	32	14.5
21-25	16	7.3
26-30	12	5.5

31-35	17	7.7
36-40	6	2.7
41-45	5	2.3
46+	4	1.9
Geographical location		
Urban	195	88.6
Rural	15	6.9
Other	7	3.2
Average calls a week		
0-5	84	38.2
6-10	43	19.5
11-15	22	10
16-20	19	8.6
21-25	6	2.7
More than 25	43	19.5

8.4.2. Demographic Variables

As shown in Table 8.2, the participants were mostly male (85.9%), European/Pākehā (79.5%), aged from 19 to 89 years old (M = 47.28, SD = 14.21). Nine people did not answer the ethnicity question. The majority was in an emergency services occupation (55%) and most had an education level of skilled trade apprenticeship (31.4%). Nineteen people did not answer the occupation question. Most participants were married/cohabiting (65.5%) and lived in the North Island (77.7%), with most of these participants living in the Wellington region (24.5%).

Table 8.2. Demographic characteristics

	N	%
Gender		
Male	189	85.9
Female	30	13.6
Age		
Mean (SD)	47.28	(14.21)
Occupation		
Emergency Services	121	55
Manager	16	7.3
Professional	27	12.3
Technician/Trade worker/Labourer	24	10.9
Community and personal service worker	6	2.7
Machinery operator/Driver	7	3.2
Highest level of education		
Up to Year 13	34	15.5
Year 13	58	26.4
Skilled trade apprenticeship	69	31.4
Bachelor's degree	47	21.4
Honour's degree	3	1.4

Master's/ Doctoral degree	9	4.1
Marital status		
Single	23	10.5
In a relationship	37	16.8
Married/Cohabiting	144	65.5
Divorced/Separated/Widowed	16	7.3
People in household		
1	23	10.5
2	77	35
3	40	18.2
4	40	18.2
5	28	12.7
6	7	3.2
More than 6	5	2.3
Ethnicity		
Māori	15	6.8
European/Pākehā	175	79.5
Pacific Peoples	3	1.4
Other	18	8.2
Residing in North Island/Te Ika-a-Māui	171	77.7
Auckland/Tāmaki-makau-rau	38	17.3
Waikato	13	5.9
Bay of Plenty/Te Moana-a-Toi	22	10
Gisborne/Te Tai Rāwhiti/Taranaki	9	4.1
Hawke's Bay/Te Matau-a-Māui	9	4.1
Manawatū-Whanganui	20	9.1
Wellington/Te Whanga-nui-a-Tara	54	24.5
Residing in South Island/Te Waipounamu	48	21.8
Tasman/Te Tai-o-Aorere to West Coast/ Te Tai Poutini	4	1.8
Canterbury/Waitaha	26	11.8
Otago/Ōtākou	12	5.5
Southland/Murihiku	6	2.7

8.4.3. Univariate Analyses: Assumption Checking

Before analyses were run to test the hypotheses, all variables were assessed on a univariate basis to consider if there were any extreme values in the data. After conversion of all values to a standard score, values were considered outliers if they were above or below three standard deviations from the mean (Osborne & Overbay, 2004). Two outliers were found on two variables; PTSS and self-regulation had one outlier each. The following questions were considered in regard to the outliers: Was the data entered correctly? Was one participant responsible for the majority of the outliers? Were the outliers part of the intended sample (Tabachnick & Fidell, 2013)? It was decided to retain the outliers due to the small number and as the outlying data points would represent a normal distribution of the sample mean

(Osborne & Overbay, 2004). Scores were likely to be representative of the population of firefighters. It has further been shown that outliers due to extreme responding show very little statistical bias (Zijlstra, van der Ark, & Sijtsma, 2011).

Further checks were completed to examine the assumptions that parametric techniques are based on. Normal assumptions for statistical analysis are normality, homogeneity of variances, and independence, with regressions having the added assumption of linearity and multicollinearity (Field, 2013). The distribution of the cumulative trauma and self-regulation scores were examined, as well as the dependent variables PTSS and depression, which allowed for conclusions to be drawn about the homogeneity of variances across all these variables. When all variables included in a regression are normally distributed, it is safe to assume homoscedasticity, which is needed for trustworthy regression results. Tabachnick and Fidell (2013) also suggested that the examination of the distribution of independent and dependent variables is needed for the determination of the validity of correlation test statistics, unless one of the variables was dichotomous. As the SI variable was dichotomous, this variable was not examined.

The common rule of thumb by Coolican (2009) was used to assess the predicted impact of the skewness and kurtosis statistics. Coolican suggested that if the difference between the mean and median is more than half a standard deviation, there is unacceptable skewness. Coolican further suggested that kurtosis greater than twice its standard error, whether positive or negative, means a significant violation of the normality assumption has occurred. On this basis, these tests did not show any violations of normality, therefore the data was considered normal, and no data transformations were undertaken. Kolgomorow-Smirnov and Shapiro-Wilk statistics are known to be overly sensitive in larger samples, so were discounted. Furthermore, Tabachnick and Fidell (2013) suggested that in sample sizes over 200 that are

visually normally distributed, the effect of skewness and kurtosis are negligible. Further, the data in this study appears consistent with sampled population and the general population. For example, the level of PTSS in the current sample was 21.4% using the cut-off score of 33 (Creamer et al., 2001). This is consistent with other PTSS rate studies of first responders, such as the level of PTSS in Chiu et al. (2011), which was 22%.

Multicollinearity is generally evaluated through the comparison of the independent variables that are used in multiple regression analyses. If there is a correlation between these variables of above .90, it is believed multicollinearity exists (Hair et al., 2006). No correlations of above .90 between the independent variables were found. For the moderation analyses, the moderating variable was centered to reduce the likelihood of multicollinearity (Echambadi & Hess, 2007). The last consideration when using multiple regression analyses is sample size. The final sample size was 220. A sample size of more than 100 ensures normality is not considered a concern (Allison, 1999). Therefore, given the sample size of this study, using multiple regression analyses was considered an acceptable statistical method.

8.5. Cumulative Trauma

As shown in Table 8.3, participants experienced on average 15.30 PTEs (*SD* = 6.57). All of the participants had experienced at least two of the seventeen PTEs in their lifetime. The most commonly endorsed LEC-5 items were transportation accident (85%), fire or explosion (84.1%), and sudden accidental death (76.4%). As can be seen in Table 8.3, for most PTEs, the participant experienced it most commonly as part of the job. Exposure to more than one PTE type was common; 99.1% (*N* = 218) reported exposure to four or more PTE types. Career firefighters (*M* = 16.53, *SD* = 7.06) reported higher levels of PTEs compared to

volunteer firefighters (M = 14.45, SD = 6.05), which was a significant difference; $t(205)$ = 2.28, p = .024. Kazantzis et al. (2010) reported an estimated 61% rate of PTE exposure in the NZ general population. The current study results show that NZ firefighters have nearly double the levels of PTE exposure (at work and in private life combined) than the NZ general population.

Table 8.3. Potentially traumatic events experienced by participants as indicated on the LEC-5

Event	Percentage					
	Experienced:	Witnessed:	Close family or friend:	As part of the job:	Not sure:	Does not apply:
Natural disaster (e.g., flood or earthquake)	47.3	39.5	24.5	64.5	2.3	6.8
Fire or explosion	21.8	43.2	18.2	84.1	0.5	1.8
Transportation accident (e.g., car accident or plane crash)	40.0	49.1	32.2	85.0	0.5	0.9
Serious accident at work, home, or during recreational activity	31.4	35.0	29.1	65.5	3.2	6.4
Exposure to toxic substance (e.g., dangerous chemicals or radiation)	28.2	12.7	5.9	67.7	9.1	12.3
Physical assaults (e.g., being attacked, or hit)	38.6	42.3	26.4	30.5	0.9	23.2
Assault with a weapon (e.g., being shot or stabbed)	17.3	12.3	12.7	26.4	3.6	43.6
Sexual assault (e.g., rape or threat of harm)	12.3	1.8	20.0	8.6	6.4	55.5
Other unwanted or uncomfortable sexual experience	23.6	8.2	30.0	6.4	6.8	41.8
Combat or exposure to a war-zone (in military or as civilian	6.8	1.8	14.1	5.5	2.3	72.3

Captivity (e.g., kidnapped or prisoner of war)	1.8	0.5	4.1	1.4	2.3	86.8
Life-threatening illness or injury	24.5	30.9	45.9	43.2	0.0	17.7
Severe human suffering	7.7	37.7	18.2	46.8	7.7	24.5
Sudden violent death (e.g., homicide or suicide)	3.6	29.1	35.5	73.2	2.3	8.2
Sudden accidental death	5.5	34.5	30.5	76.4	1.8	5.5
Serious injury, harm, or death you caused to someone else	3.2	9.1	5.5	20.9	3.6	64.1
Any other very stressful event or experience	33.2	26.8	22.3	62.3	11.8	6.8

The most distressing event that participants described was sudden accidental death, which included fatal house fires and transportation incidents. A recurrent theme was that it was most distressing when children were involved in car accidents, or youth in suicides. Most also described that exposure to the grief and distress from family members and loved ones were the memories that kept haunting them. Many indicated that when victims were familiar to them, it was more distressing. Furthermore, a large proportion of participants described horrific scenes with multiple fatalities and severe injuries. Lastly, most participants indicated it was not necessarily one event that caused them distress, but the cumulative effect of them all.

8.6. PTSS

The PCL-5 total in this sample ranged from 0 to 69 (M = 18.90, SD = 15.86). The Cronbach's alpha for this scale in this research was $\alpha = .95$. The most frequently endorsed item (*quite a bit* and above) was *Avoiding memories, thoughts, or feelings related to the stressful experience* (20.5%). Of the sample, 21.4% scored over the cut-off of 33 which

suggested that participants above this score may have PTSS (Weathers, Litz, et al., 2013). However, a diagnosis of PTSS cannot be confirmed without a clinical assessment. Wells et al. (2006) estimated the general NZ population 12-month level of PTSS to be 3%, which is seven times less than the current sample of firefighters. Contrary to expectation, career firefighters did not score significantly higher than volunteer firefighters ($p = 0.527$).

8.7. Depression Symptoms

The PHQ-9 total scores for this sample ranged from 0 to 25 ($M = 6.34$, $SD = 6.17$). In this research, the Cronbach's alpha for this scale was $\alpha = .91$. The most frequently endorsed item (*more than half the days* and above) was *Trouble falling or staying asleep, or sleeping too much* (27.3%). PHQ-9 item scores are summed to obtain a total score between 0 and 27, with a score of 0-4 indicating no symptoms consistent with depression, 5-9 symptoms consistent with mild depression, 10-14 symptoms consistent with moderate depression, 15-19 symptoms consistent with moderately severe depression, and 20-27 symptoms consistent with severe depression. Of the current sample of firefighters 11.8% met the cut-off score for moderately severe depression. The final question on the PHQ-9 (*How difficult have these problems made it for you to do your work, take care of things at home, or get along with other people*) represents participants' global impression of symptom-related impairment. Again, contrary to expectation, career firefighters did not score significantly higher than volunteer firefighters ($p = 0.679$).

8.8. Suicidal Ideation

A composite score of suicidal behaviours was calculated for career SI levels since becoming a firefighter (for current firefighters) and of suicidal behaviours while serving as a firefighter (for retired firefighters). The Cronbach's alpha for this scale in this research was α

= .76 for retired firefighters, α = .64 for current firefighters, and α = .65 for the whole sample. While the Cronbach's alpha for retired firefighters is good, the lower Cronbach's alpha for the current firefighters and the sample overall is expected due to this scale only having four items; however, the full SITBI-SF has been found to have strong interrater reliability (average κ = .99, r = 1.0), test-retest reliability (average κ = .70) and concurrent validity with other measures of SI (average κ = .54; Nock et al., 2007).

Of the sample, 32.3% reported career suicidal ideation, 10.5% reported career suicide plans, 4.5% reported at least one career suicide attempt, and 6.4% reported career nonsuicidal self-injury (NSSI). Again, contrary to predictions, there were no significant differences between career and volunteer firefighters in career suicidal ideation ($p = 0.745$), career suicide plans ($p = 0.873$), attempts ($p = 0.414$), and NSSI ($p = 0.396$).

8.9. Self-Regulation Skills

After reverse coding nine items, the scores from the 13 items of the BSCS were summed to calculate a total score, with higher scores indicating higher self-regulation skills. The total possible scores on the BSCS range from 13-65; the BSCS total for the current sample ranged from 21 to 62 ($M = 46.31$, $SD = 7.77$). The Cronbach's alpha for this scale was α = .84, which is consistent with the good internal consistency found in previous research (αs ranging from .83 to .85; Tangney et al., 2004).

8.10. Correlations[4]

Bivariate and point-serial correlations were used to assess the relationship between variables. As seen in Table 8.4, the bivariate and point-serial correlations demonstrated that

[4] Some of the information presented in 8.10 and 8.11 is repeated in Chapter 7

suicidal ideation was positively correlated with suicide plans, $r_{pb} = .46$, $p < .001$, attempts, $r_{pb} = .27$, $p < .001$, and NSSI, $r_{pb} = .34$, $p < .001$, as well as with PTSS, $r_{pb} = .42$, $p < .001$, depression, $r_{pb} = .47$, $p < .001$, younger age, $r_{pb} = -.21$, $p < .01$, gender, $r_{pb} = .18$, $p < .01$, urban/rural location, $r_{pb} = .20$, $p < .01$, and inversely correlated with marital status, $r_{pb} = -.15$, $p < .05$. Suicide plans was positively correlated with lower education levels, $r_{pb} = -.14$, $p < .05$, suicide attempts with occupation, $r_{pb} = .14$, $p < .05$ and NSSI was inversely correlated with marital status, $r_{pb} = -.14$, $p < .05$. While trauma exposure was not found to be correlated with SI, it was positively correlated with NSSI, $r_{pb} = .15$, $p < .05$, and PTSS, $r = .19$, $p < .01$, as well as with volunteer/career status, $r_{pb} = .16$, $p < .05$, and number of weekly calls, $r = .19$, $p < .01$.

Table 8.4. Bivariate and point-serial correlations between dependent and predictor variables.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	Suicidal Ideation	1	.46***	.27***	.34***	.08	.42***	.47***	-.35***	-.21**	.18**	.01	.02	.02	-.20**	.02	-.05	.01	-.15*	-.01	.10	-.07
2	Suicide Plans		1	.57***	.22**	.13	.26***	.27***	-.21**	-.08	.23**	.02	-.01	.01	-.11	.03	.08	-.14*	-.12	-.06	-.01	-.08
3	Suicide Attempts			1	.30***	.08	.19**	.16*	-.14*	-.09	.21**	-.05	-.06	-.07	-.07	.04	.14*	-.09	-.09	-.07	.06	-.01
4	Nonsuicidal Self-Injury				1	.15*	.22**	.21**	-.09	-.14*	.15*	-.05	.06	-.02	-.08	.06	-.05	-.05	-.14*	.01	-.03	-.10
5	Trauma Exposure					1	.19**	.13	-.08	-.09	.00	-.06	.16*	-.01	.01	.19**	-.03	-.11	-.02	-.01	.11	.01
6	PTSS						1	.77***	-.43***	-.14*	.17*	-.07	.04	-.11	.01	.07	-.02	-.09	-.19**	-.03	-.01	-.08
7	Depression							1	-.45***	-.12	.25***	-.02	-.03	-.12	-.03	.02	.01	-.10	.21**	-.05	.03	-.16*
8	Self-regulation skills								1	.16*	-.11	.01	-.07	.08	.02	.02	-.01	.17*	.14*	-.12	.06	.11
9	Age									1	-.22**	.70**	.16*	.30**	.20**	.09	-.13	.11	.42**	-.27**	-.09	.08
10	Gender										1	.31**	-.28**	-.24**	-.01	-.19**	.29**	-.16*	-.25**	.06	-.12	-.04
11	Years of service											1	.29**	.49**	.01	.15*	-.26**	-.01	.29**	-.12	-.08	.08
12	Volunteer/Career												1	.20**	-.03	.77**	-.52**	.01	.10	-.01	.07	-.06
13	Rank													1	.06	.18**	-.20**	.02	.11	-.07	-.04	.13
14	Urban/Rural														1	-.07	.03	.03	-.02	-.12	-.01	-.02
15	Weekly calls															1	-.41**	.02	.04	-.11	.01	-.05
16	Occupation																1	-.17*	-.13	.03	-.10	-.02
17	Highest level of education																	1	.13*	-.09	-.02	.10
18	Marital status																		1	.05	-.02	.02
19	Household #																			1	-.02	-.07
20	Ethnicity																				1	.01
21	North/South Island																					1

Note. PTSS = posttraumatic stress symptoms
* $p < .05$, ** $p < .01$, *** $p < .001$

Further, PTSS was positively correlated with suicide plans, $r_{pb} = .26$, $p < .001$, suicide attempts, $r_{pb} = .19$, $p < .01$, NSSI, $r_{pb} = .22$, $p < .01$, depression, $r = .77$, $p < .001$, gender, $r = .17$, $p < .05$, and younger age, $r = -.14$, $p < .05$ as well as inversely correlated with marital status, $r = -.19$, $p < .01$. Depression was positively correlated with suicide plans, $r_{pb} = .27$, $p < .001$, suicide attempts, $r_{pb} = 16$, $p < .05$, NSSI, $r_{pb} = .21$, $p < .01$, marital status, $r = .21$, $p < .01$, as well as gender, $r = .25$, $p < .001$ and inversely correlated with North/South Island location, $r = -.16$, $p < .05$.

As expected, suicidal ideation, $r_{pb} = -.35$, $p < .001$, suicide plans, $r_{pb} = -.21$, $p < .01$, suicide attempts, $r_{pb} = -.14$, $p < .05$, PTSS, $r = -.43$, $p < .001$, depression, $r = -.45$, $p < .001$, were inversely correlated with self-regulation skills. Further, self-regulation was positively correlated with level of education, $r = .17$, $p < .05$, and marital status, $r = .14$, $p < .05$. Age was inversely correlated with NSSI, $r_{pb} = -.14$, $p < .05$, and positively correlated with self-regulation skills, $r = .16$, $p < .05$. Lastly, gender was positively correlated with suicide plans, $r_{pb} = .23$, $p < .01$, suicide attempts, $r_{pb} = .21$, $p < .01$, and NSSI, $r_{pb} = .15$, $p < .05$.

8.11. Moderation Analysis

A moderation analysis examines circumstances where the relationship between the independent and the dependent variable alters due to the moderating variable. In the hypothesis of this study, the independent variable was cumulative trauma exposure, and the dependent variables were PTSS, depression, and SI. The results of hypothesis 5 show that cumulative traumatic exposure had a significant positive relationship with PTSS and NSSI, but not with depression and SI. Moderation analyses were performed with PTSS, depression, and SI as dependent variables. The moderating variable was self-regulation skills. As previously mentioned, to complete a moderation analysis, the independent and moderating variables are centered, which is achieved through subtracting each variable's mean from the

observed score. Following this, an interaction term is created by multiplying these centered variables together (Howell, 2010).

Hypothesis 6 was then tested with a moderation analysis using a hierarchical multiple regression. As eight other variables significantly correlated with the dependent variables, they were included in the moderation analyses (Allison, 1999). These control variables included suicidal ideation, suicide plans, suicide attempts, NSSI, depression, age, gender, and marital status.

Moderation analysis was conducted following the process outlined in Frazier et al. (2004). At Step 1 of the multiple regression, the dependent variable was placed in the equation, and the centered independent variable as well as the control variables were added as independent variables. At Step 2, the centered moderating variable was added as an independent variable, while at Step 3, the interaction variable was added as an independent variable.

Results showed that as cumulative trauma exposure increased, the higher the level of psychological distress was experienced by firefighters. The interaction effects were plotted using an online computer program (Jose, 2013). These steps were first taken for PTSS. The results of this procedure were discussed and presented in Figure 1 in Chapter 7.

Cumulative trauma exposure significantly predicted depression, $\beta = .-.122$, $t(208) = -2.595$, $p = .010$. Cumulative trauma exposure also explained a significant portion of the variance in depression scores, R^2 of .646, $F(11, 208) = 34.566$, $p < .001$. The procedure was then repeated for depression. The program produced a high score of one standard deviation above the mean and a low score of one standard deviation below the mean for the dependent variable of depression in relation to the interaction between the moderator variable self-regulation skills and the independent variable cumulative trauma exposure. The moderation interaction of the effect of cumulative trauma exposure and self-regulation on depression was plotted on a graph (see Figure 8.1). The scores for this interaction were: .23 (Low Cumulative

Trauma and High Self-Regulation), 2.15 (Low Cumulative Trauma and Low Self-Regulation), 0.77 (High Cumulative Trauma and High Self-Regulation), and 1.87 (High Cumulative Trauma and Low Self-Regulation). Figure 8.1 shows that self-regulation skills moderate the cumulative trauma exposure to depression relationship. The relationship between cumulative trauma exposure and depression was positive for high self-regulation, with increased cumulative trauma exposure leading to higher levels of depression. While firefighters with low self-regulation skills were much more likely to experience depression than firefighters with high self-regulation skills, they appeared to experience a small decrease in depression with increased cumulative trauma exposure. It is possible these firefighters instead experienced PTSS or SI, rather than symptoms of depression.

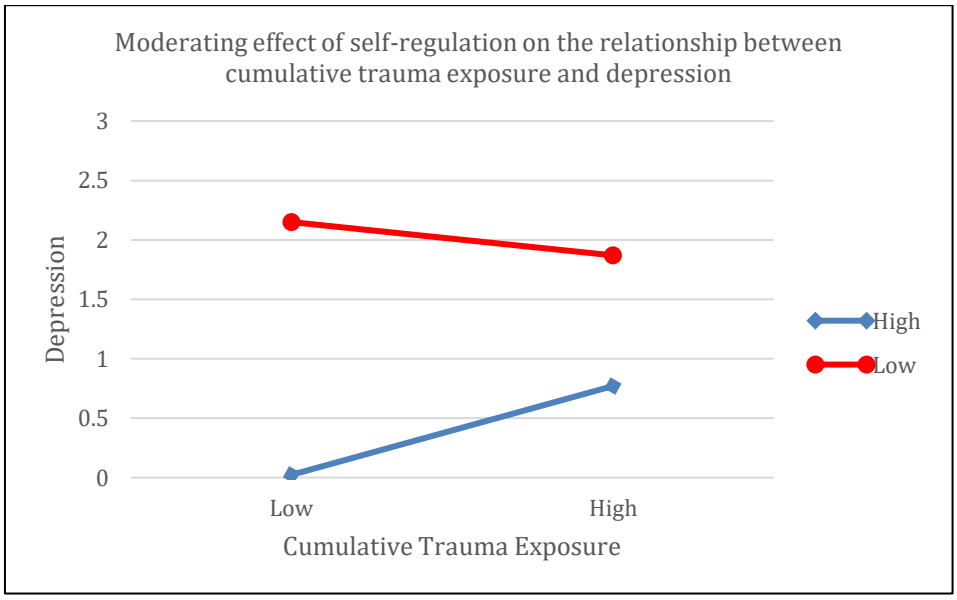

Figure 8.1. Moderating effect of self-regulation on the relationship between cumulative trauma exposure and depression

The procedure was then repeated for SI. Cumulative trauma exposure significantly predicted SI, β = .-.121, $t(208)$ = -1.994, p = .047. Cumulative trauma exposure also explained a significant portion of the variance in SI scores, R^2 of .413, $F(11, 208)$ = 13.290, $p < .001$. The program produced a high score of one standard deviation above the mean and a low score of one standard deviation below the mean for the dependent variable of SI in

relation to the interaction between the moderator variable self-regulation skills and the independent variable cumulative trauma exposure. The moderation interaction of the effect of cumulative trauma exposure and self-regulation on depression was plotted on a graph (see Figure 8.2). The scores for this interaction were: 2 (Low Cumulative Trauma and Low Self-Regulation), 1 (Low Cumulative Trauma and High Self-Regulation), 6 (High Cumulative Trauma and Low Self-Regulation), and 3 (High Cumulative Trauma and High Self-Regulation). Figure 8.2 shows that self-regulation skills moderate the cumulative trauma exposure to SI relationship. As was expected, the relationship between cumulative trauma exposure and SI was positive for both high and low self-regulation, with increased cumulative trauma exposure leading to higher levels of SI. However, firefighters with low self-regulation skills were much more likely to develop SI with increased cumulative trauma exposure, while firefighters with high self-regulation skills experienced only a small increase in SI with increased cumulative trauma exposure.

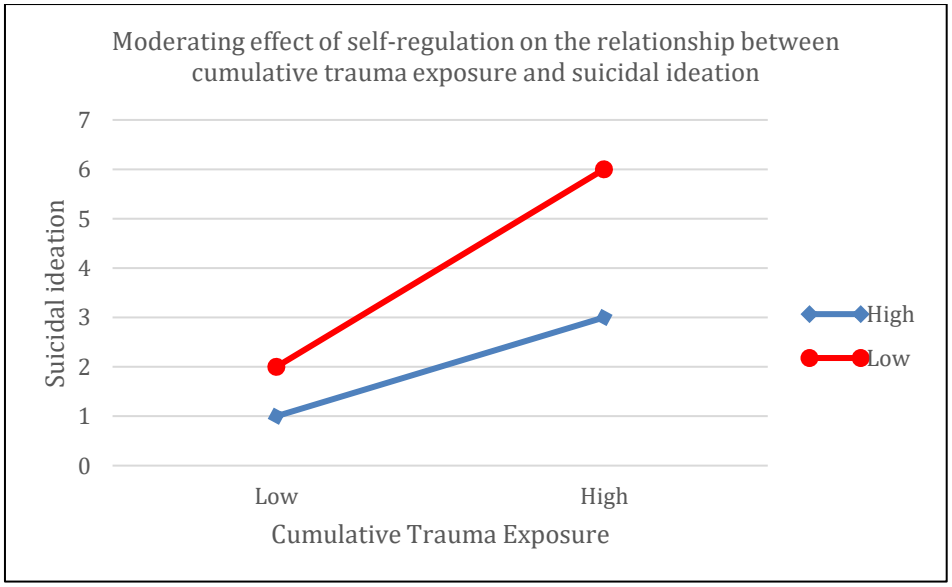

Figure 8.2. Moderating effect of self-regulation on the relationship between cumulative trauma exposure and suicidal ideation

8.12. Discussion and Conclusion

Aim 1. The first aim was to investigate cumulative trauma exposure and psychological distress in a sample of NZ firefighters. While there are no numbers available for PTE exposure of the NZ general population, the results of this study showed that, as predicted, PTE exposure in NZ firefighters was double the levels of PTE exposure than the Australian general population. More than 99% of the firefighters reported being exposed to four or more PTE types, while estimates for the Australian general population was a PTE exposure rate of 50-65% (Creamer et al., 2001). Therefore, hypothesis one (*PTE exposure in a sample of NZ firefighters will be higher than PTE exposure in the general population*) is supported.

The results further showed that, as predicted, PTSS, depression, and SI levels in NZ firefighters were significantly higher than those in the general population. For PTSS, 21.4% of the sample scored over the cut-off of 33, which is 11 times the estimated the general NZ population 12-month level of 3% (Wells et al., 2006). For symptoms of depression, the 11.8% of the participants met the cut-off score for moderately severe depression, while the estimated rate of the NZ general population is 5.7%, which means the current sample of firefighters were more than twice likely to experience depression symptoms (Oakley-Browne et al., 2006). It is possible that this is to do with disturbed circadian rhythms from doing shift work, considering the most frequently reported symptom was sleep disturbance. Furthermore, firefighters internationally have been estimated to have a rate ranging between 9% (McFarlane & Papay, 1992) and 21% (Saijo et al., 2008).

Suicidal ideation in the current sample was 32.3% for career suicidal ideation, 10.5% for career suicide plans, 4.5% for making at least one career suicide attempt, and 6.4% for career nonsuicidal self-injury. Comparatively, the NZ general population lifetime rate is estimated to be 15.7% for suicidal ideation, 5.5% for suicide plans and 4.5% for making at least one

suicide attempt (Beautrais et al., 2006). As with PTSS and depression, this shows that NZ firefighters are more than twice as likely to experience suicidal ideation as well as make suicide plans and 1.5 times more likely to make a suicide attempt than the general NZ population. As previously mentioned, these results should be interpreted with caution.

A large birth cohort study in NZ found a NSSI lifetime rate of 34% (Coppersmith et al., 2017); however, it should be noted that these participants were 26 years old at the time of the study, so not necessarily representative of the wider NZ population. A second study among NZ university students showed a 38% level of lifetime NSSI (Fitzgerald & Curtis, 2017); however, the majority of these participants were also younger than 25. At the time of writing, no data appeared to be available on NSSI in the general NZ population. Taken together, these results show that in all instances (outside of NSSI), the current sample of NZ firefighters are significantly more likely to experience psychological distress than the general NZ population. Therefore, hypothesis two (*Psychological distress in a sample of NZ firefighters will be significantly higher than psychological distress in the general population*) is supported.

Literature showed volunteer firefighters experienced higher levels psychological distress than career firefighters. Stanley et al. (2015) reported higher levels of SI for firefighters serving in all-volunteer departments than firefighters working full-time. Furthermore, volunteer firefighters showed higher levels of PTSS, depression, and SI compared to career firefighters (Stanley, Boffa, et al., 2017). Contrary to expectations based on the literature, results did not show that NZ volunteer firefighters experienced significantly higher levels of PTSS, depression, and SI than career firefighters, which means hypothesis three (*Psychological distress will be significantly higher in NZ volunteer firefighters than in career firefighters*) was not supported. While these results are conflicting with the expectations based on literature, it is not unprecedented. The authors of two Canadian studies have

suggested that career firefighters are at higher risk than volunteer firefighters (Wagner & O'Neill, 2012). They cautioned that a direct comparison was not appropriate, as their data was drawn from different samples, yet they did suggest that their comparison of means suggested career firefighters were at greater risk, and future research should be undertaken. A more recent study with Australian firefighters found that the rate of PTSS and psychological distress was similar in career and volunteer samples (Milligan-Saville et al., 2018).

The last hypothesis of aim 1, hypothesis four (*PTSS and depression will have a significant positive relationship with SI*) was supported, as PTSS and symptoms of depression showed a significant positive relationship with SI, both with a medium effect.

Aim 2. The second aim of the current project was to investigate the relationship between PTEs and psychological distress in a sample of NZ firefighters. As expected, results showed that the more PTEs were experienced, the higher the levels of PTSS and the levels of NSSI, both with a small effect size. Contradictory to expectations, the results showed no significant relationship between the amount of PTEs experienced and depression or suicidal ideation, suicide plans and attempts. Therefore, hypothesis five (*Cumulative traumatic exposure will have a significant positive relationship with psychological distress*) was partly supported.

Aim 3. The last aim of the current thesis was to investigate whether better self-regulation skills are associated with less psychological distress in a sample of NZ firefighters, and whether they weaken the relationship between PTEs and psychological distress. The results showed there was a significant difference between participants with high and those with low self-regulation skills. This difference was predicted in hypothesis six. Accordingly, hypothesis six (*Self-regulation skills will moderate the relationship indicated in H5, such that the relationship will be weaker for those who are high in self-regulation skills*) is supported.

CHAPTER 9: Discussion

9.1. Overview

Previous research has demonstrated that psychological distress is more prevalent in first responders than in the general public, with an estimate of 80% of first responders being exposed to PTEs, and 10 to 15% meeting the criteria for PTSS diagnosis (Klimley et al., 2018). Yet a lot of studies in the field of psychological distress have focused on victims of PTEs, including military, rather than the first responders, with literature on psychological distress in firefighters even less prevalent. No quantitative research was found on psychological distress in NZ firefighters. The present study fills a gap in the literature by exploring the impact of self-regulation skills and cumulative trauma exposure on psychological distress in firefighters.

This chapter will provide a commentary on the results of the examination of the hypotheses. After a review of the research aims and hypotheses, implications of these findings and how they can help the development and implementation of prevention and treatment interventions for NZ firefighters will be discussed. Following this, the web-based methodology used in this project and the limitations of this study will be discussed, followed by recommendations for future research. Information from the manuscripts will not be repeated. Finally, the main conclusions of this research will be summarized.

9.2. Results of Research Aims and Hypotheses

The overall aim of this research was to examine how PTEs lead to PTSS, depression, and SI in a sample of NZ firefighters as well as investigate how self-regulation skills moderate this relationship. The research question used to examine this was: What is the level of PTSS, depression and SI in NZ firefighters and what factors play a role in the development and improvement of these psychological injuries? The aims of this project were: 1) to investigate cumulative trauma exposure and psychological distress in a sample of NZ firefighters, 2) to investigate the relationship between PTEs and psychological distress in a sample of firefighters, and 3) to investigate whether self-regulation skills are associated with less psychological distress in a sample of NZ firefighters, and whether self-regulation skills moderate the relationship between PTEs and psychological distress, with psychological distress encompassing PTSS, depression, and SI.

9.2.1. Potentially Traumatic Events

As mentioned in the literature review, first responders and firefighters have been found to experience significantly more PTEs than the general population (Skeffington et al., 2017). In fact, for firefighters, trauma is not an isolated incident, but instead contains a series of ongoing incidents, leading to cumulative trauma exposure. The results of this study are consistent with those of other studies and suggest that NZ firefighters also experience significantly more PTEs than the general population (Creamer et al., 2001).

Specific comparison to other studies with firefighters was made complex due to the variety of ways the numbers have been reported. For example, Paltell et al. (2019) reported the mean

of traumatic events, which was 12.41. Lee (2019) reported 32% of their participants experienced 5 or more PTEs as part of their job. Stanley et al. (2017a) reported 35% of their participants experienced a PTE themselves, 17% witnessed it, 9% learned about it happening to a close friend or family member, while 31% were exposed to it as part of their job. Other studies using the Traumatic Stress Schedule found 97% of their Australian participants experienced at least one PTE, and 83% two or more over the past five years (Skeffington et al., 2017). These results seem to be consistent with the results of the current study, as 99.1% of the sample reported exposure to four or more PTE types. Yet other studies have opted for the use of the Painful and Provocative Events Scale, which is a 26-item questionnaire (Stanley et al., 2020). Their sample's mean score was 55.01, indicating a high frequency of exposure to PTEs.

An important consideration in the result of this current study is the use of the LEC-5 as a measure of PTEs. A limitation of the LEC-5 is that participants are only able to indicate which events they have experienced in various aspects of their lives, not how many events. Future research should use a similar measurement, with the addition of providing participants the opportunity to indicate how many times they have experienced a certain event. Second, the ability of participants to remember all incidences of PTEs may be limited. These aspects of the measurement of PTEs will be discussed later in this chapter.

9.2.2. Psychological Distress

Hypothesis 1 predicted that psychological distress in NZ firefighters would be significantly higher than psychological distress in the general NZ population. The results of the current study supported this prediction and found that NZ firefighters experienced double

or more psychological distress than the general NZ public. First, PTSS levels were found to be 11 times the estimated rate of the general population of 3% (Wells et al., 2006). Depression levels, suicide ideation and suicide plans were found to be double the general population, while suicide attempts in firefighters were 1.5 times the general population estimate (Beautrais et al., 2006; Oakley-Browne et al., 2006).

9.2.2.1. PTSS.

In this study, when using a cut-off score of 33 on the PCL-5 that indicates probable PTSS (Weathers, Blake, et al., 2013), approximately 21% of the sample were above the recommended diagnostic cut-off score. In comparison to other studies with firefighters, base rates of PTSS using the diagnostic cut-off score from the PCL-5 have been found to be 19% (Stanley, Hom, et al., 2019), 20% (Stanley, Hom, et al., 2017a), and 27% (Bartlett, Jardin, et al., 2018b). However, it should be noted that a diagnosis of PTSS can only be made by a mental health clinician.

Other studies using the PCL-5 have used a mean score of the 20 items, for example, Sun et al. (2020) found the rate of PTSS among their sample was 5%. The PCL-5 is relatively new, however, there are other studies that have used the Impact of Event Scale (IES) or the revised version of the Impact of Event Scale (IES-R) and estimated the level of PTSS. There are some other studies, which have used the Civilian Version of the PCL (PCL-C-17), which comprises of 17 items instead of 20 items. Noor et al. (2019) used a cut-off score of 39 and found 20% of female and 12% of male firefighters reported PTSS. Del Ben et al. (2006) found 8% of firefighters met the criteria for PTSS when using a cut-off score of 44. Noor et al. used the IES, which measures only two sub-constructs of the DSM-5 definition of PTSS.

Del Ben et al. used the cut-off score of 19 and found 22% of the sample met the criteria for PTSS. Using the same cut-off score, another study found 91% of their sample met the criteria for PTSS when using a cut-off score of 44 (Skeffington et al., 2017).

The only study that examined PTSS levels in the general population of NZ (Wells et al., 2006) used the World Health Organization World Mental Health Survey Initiative version of the Composite International Diagnostic Interview (CIDI 3.0), which is a fully structured diagnostic interview. The comparison should therefore be interpreted with caution.

9.2.2.2. Depression.

In this study, when using a diagnostic cut-off score of 15 for moderately severe levels of symptoms of depression on the PHQ-9 (Kroenke et al., 2001), approximately 12% of the sample were above the recommended cut-off score. Further, using the diagnostic cut-off score of 20 for severe levels of symptoms of depression, 3% of the sample were above the cut-off score. In comparison to other studies with firefighters, base rates of symptoms of depression using a diagnostic cut-off score from the PHQ-9 have been found to be 14% for moderate-severe and severe (Jones et al., 2018), which is comparable to the findings of this study. Park et al. (2015) used the mean score of the PHQ-9 and found their sample had a mean score of 11.75. Sun et al. (2020) and Saijo et al. (2008) used the Centre for Epidemiological Studies of Depression Scale (CES-D) with a cut-off score of 16 and found 28% and 31% of their samples respectively reported experiencing symptoms of depression, which are both higher than the percentage of the sample in this study.

This comparison shows that, while significantly higher than the general population, symptoms of depression levels in the current sample are lower than some of the other studies.

This may be due to the obvious explanation that the sample is able to manage the outcomes of the PTEs, or that the participants are underreporting the symptoms. It may also be that the participants are not aware of the impact of PTEs, which was confirmed by the comments of some participants, who stated that "none of these incidents affect me." It could also be that these participants are the ones that scored higher in self-regulation skills, which will be discussed in section 9.2.4.

9.2.2.3. Suicidal Ideation.

In this study, using the SITBI-SF (Nock et al., 2007), approximately 32% of the sample experienced SI, 11% suicide plans, 5% at least one attempt and 6% NSSI. These results are comparable to findings in literature, such as American studies that found suicide ideation, plans, attempts and NSSI base rates of 38%, 11%, 4%, and 9%, respectively (Stanley, Hom, et al., 2017b); 30% of female and 15% of male firefighters reporting lifetime SI (Noor et al., 2019); and more than one third reporting a high risk for suicidality (Jones et al., 2018).

In terms of the NZ general population, the lifetime rate of suicidal ideation has been estimated at 15.7% and for suicide plans 5.5% (Beautrais et al., 2006), which means that NZ firefighters at rates of 32% and 11% are more than twice as likely to experience suicidal ideation and suicide plans than the NZ general public. Further, the rate of 5% of NZ firefighters making at least one suicide attempt is also slightly higher than that of the NZ general population at 4.5%. No significant differences in suicidal ideation between volunteer and career firefighters were found in this study. While it should be noted, as previously mentioned, that these results should be interpreted with caution, the results do confirm what

has been found in literature. Even interpreted with caution, these numbers suggest that intervention and prevention should be given priority in training programmes.

9.2.2.4. Career and Volunteer.

With respect to the second hypothesis, unlike the previous studies of Stanley et al. (2015) and Stanley, Boffa, et al. (2017), no significant observed difference was found between career and volunteer firefighters in levels of psychological distress in the current study. This was the case even though career firefighters were exposed to significantly more PTEs. As discussed in Chapter 7, this discrepancy could be attributed to the rigorous recruitment and screening process for career firefighters, the more abrupt transitioning between civilian life and trauma exposure, and the higher possibility of familiarity with the victim for volunteers, as well as the ever-changing composition of the crews on fire trucks, compared to a relatively stable crew on career trucks. In addition, it is possible that the career firefighters in this study experienced a plateau effect of PTEs. Further research may be able to explore this in more detail.

9.2.2.5. The Relationship of PTSS and Depression With Suicidal Ideation.

Hypothesis four of this study suggested that PTSS and depression would have a significant positive relationship with SI. The results of the study supported this prediction. The moderate correlation between PTSS and suicidal ideation and between depression and suicidal ideation were consistent with other studies, such as Martin et al. (2017) and Boffa et al. (2017), who found that more severe PTSS was significantly associated with suicidality. The confirmation of these results is important as intervention when firefighters experience PTSS might lead to lower suicidality in this population.

9.2.3. The Relationship Between PTEs and Psychological Distress

Prior studies have noted the importance of PTEs on the development of psychological distress in firefighters (Onyedire et al., 2017; Regehr et al., 2000). Hypothesis five therefore predicted that cumulative trauma exposure would have a significant positive relationship with psychological distress. This hypothesis was partly supported by the results of the current study. Cumulative trauma exposure was found to have a significant positive relationship with PTSS as well as with NSSI, but not with depression, suicidal ideation, plans and attempts. While these results showed that cumulative trauma exposure did lead to significant consequences on psychological distress, no difference was found in the psychological distress levels between career and volunteer firefighters. As discussed in Chapter 7, this inconsistency may be due to various reasons, such as recruitment and screening processes, crew changes, the sudden transition from civilian life and the higher likelihood to be familiar with the victim for volunteers.

9.2.4. The Impact of Self-Regulation Skills

The current study confirms the prediction of hypothesis six, which stated that self-regulation skills would moderate the relationship between PTEs and psychological distress. The results from the current study show that self-regulation skills have a clear tendency to moderate the impact of cumulative trauma exposure on the development of psychological distress. This accords with findings of previous research, as Baumann et al. (2005) found that

PTEs were particularly damaging to individuals' wellbeing when self-regulation skills and coping abilities were low.

Of particular importance was the moderate significant inverse correlation between self-regulation and PTSS, depression, and SI. These results are particularly encouraging. While it may be impossible to lessen the exposure of firefighters to PTEs, it could conceivably be hypothesized that interventions aimed to increase firefighters' self-regulation skills would in turn lead to fewer or less severe consequences of cumulative trauma exposure. Tangney et al. (2004) described self-regulation as the ability to regulate the self strategically in response to environmental demands and suggested that people who have high self-control or self-regulation are more likely to act more socially desirable, or putting their community above self, which is fitting for firefighters. More research on this topic needs to be undertaken before the association between cumulative trauma exposure, self-regulation skills, and psychological distress is more clearly understood. Future research incorporating specific interventions would help to clarify these findings.

9.3. Implications of This Research

The evidence from this study suggests that firefighters who have high self-regulation abilities experience fewer negative consequences of cumulative trauma exposure. These are encouraging findings, as self-regulation skills are skills that are malleable and can be enhanced. This finding has important clinical and practical implications for developing both preventative as well as treatment interventions. Self-regulation has been shown to predict better adjustment, lower psychopathology, and higher self-esteem, as well as better relationships and interpersonal skills. Due to practical constraints, this thesis cannot provide a

comprehensive review of all the strategies to improve self-regulation; however, some strategies might involve cognitive distraction, behavioural diversion, or cognitive reappraisal (Totterdell & Parkinson, 1999). Tang et al. (2007) found that short-term meditation training improved self-regulation as well.

9.4. Limitations and Weaknesses of the Research

It was beyond the scope of this study to examine large numbers of firefighters over a longer period of time. The cross-sectional design limits the interpretation of causal relationships between the observed variables. Future research utilizing longitudinal designs, more objective measures and larger samples would be helpful to expand on the findings of the current study. Based on the findings of this study, future research using an intervention design would be invaluable. Furthermore, the convenience sampling may have led to a differential response bias, and results may not necessarily be generalizable to the entire FENZ population; however, it should be noted that the rates of PTSS and other psychological distress measures were comparable to previous studies, as previously mentioned. However, cross-sectional studies have advantages as well, such as the opportunity to compare many variables at the same time.

The reader should bear in mind that the study is based on retrospective data collection and self-report data collection. Retrospective data collection has been found to be not as effective as prospective data collection (Sarafino, 2005). Rates of self-reported suicidality and PTSS may have been diminished due to the potential of work ramifications, for example, having colleagues depend on them heavily, being labelled as ‘heroes’ in the media or community,

might affect firefighters' willingness to open up about mental struggles (Kehl et al., 2014). It is likely that the voluntary and anonymous nature of the study has alleviated this potential.

9.5. Recommendations for Future Research

Feedback from participants indicated they were very grateful for the opportunity this work provided them with. Many expressed the desire to expand on their answers in more detail. Future research might want to focus on combining the quantitative aspect of this study with a qualitative setup to provide participants with this opportunity.

Further future research may also want to incorporate specific interventions to assess which alleviate the consequences of cumulative trauma exposure on psychological distress more. Examples of this may be short-term meditation trainings, which have been shown to improve self-regulation (Tang et al., 2007).

Finally, future research might want to include the opportunity to examine large numbers of firefighters over a longer period of time. This type of research may be able to assess psychological distress prior to starting employment or volunteering for FENZ, and assess psychological distress at various points in time to establish causal relationships.

9.6. Main Conclusions

There have been calls to establish a more in-depth picture of the psychological distress in firefighters in NZ. There is a dearth of research on the presence, rate, and severity of psychological distress, and building a better understanding of this will aid in building resources to help prevent and alleviate psychological distress in NZ firefighters.

Very little was found in the literature on the level of psychological distress in firefighters in Australasia, with most of the studies focused on Australia. Quantitative studies undertaken with NZ first responders did not generally have firefighters in their samples. Therefore, at the time of writing, this study is the only quantitative study examining the levels of psychological distress in NZ firefighters. Therefore, this study provided an important opportunity to advance the understanding of psychological distress in a sample of NZ firefighters, as well as some contributing and protective factors of the psychological distress.

This study provides new insights into the factors that contribute as well as the factors that alleviate psychological distress in firefighters. Understanding the moderation of self-regulation skills on the relationship between cumulative trauma exposure and psychological distress will help develop and implement both prevention and treatment interventions to alleviate the consequences of cumulative trauma exposure in NZ firefighters.

This study makes a major contribution to research on first responders by demonstrating that a sample of NZ firefighters experienced psychological distress levels that are double, or more than double that of the NZ general population. Despite the overall level of psychological distress in firefighters, not many brigades inquire about or monitor the psychological wellbeing of their firefighters. Combined with a general reluctance to open up about such problems due to stigma and a culture of self-reliance (Jones et al., 2018), there are far reaching implications of these findings. There are still many unanswered questions about psychological distress in NZ firefighters, and in particular about the factors that may alleviate this distress. Future studies on the current topic are therefore recommended.

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Appendices

Appendix A. Overview of Studies (Used in the Scoping Review) (N = 46)

#	Author(s), Primary Purpose of the Study	Event and Sample Information	Research Design and Suicidal Ideation Assessment	Major Suicidal Ideation Findings	Stats Reported
1	Bartlett et al. (2018a), To explore the moderating role of distress tolerance (DT) in the association between PTSS and SI.	No specific event Career firefighters (N = 765); United States (a large metropolitan area in southern US)	Web based self-report survey Suicide Behaviours Questionnaire-Revised (SBQ-R)	Firefighters with high PTSS and low levels of DT portrayed highest levels of suicide risk and perceived likelihood of future suicide attempt (SA).	*B* = -0.11, *SE* = 0.04, 95% CI [-0.20, -0.02] (for global suicidality) *B* = -0.29, *SE* = 0.12, 95% CI [-0.53, -0.04] (for future SB)
2	Bartlett, Smith et al. (2018), To examine whether military veteran firefighters experience higher rates of mental health symptoms than	No specific event Career firefighters (N = 910); United States (a large	Web based self-report survey SBQ-R	Military veteran sample (N = 209) showed significantly elevated rates of sleep disturbance, depression and PTSS severity; however, the small effect sizes may indicate the between-group	$F(1,824) = 0.74$, $p = .390$, $\eta^2 = .01$ (difference in SI *ns*)

	nonmilitary veteran firefighters.	metropolitan area in southern US)		differences were negligible. No significant difference in trauma exposure, alcohol use or SI.	
3	Bing-Canar et al. (2019), To examine the influence of problematic alcohol use and PTSS on suicide risk.	All endorsed at least one traumatic event on the LEC-5 Trauma-exposed career firefighters (N = 632); United States (a large metropolitan area in southern US)	Web based self-report survey SBQ-R	PTSS and problematic alcohol use were each linked to elevated suicide risk; however, PTSS did not moderate the relationship between alcohol use and suicide risk. All PTSS clusters were linked to elevated suicide risk.	OR = 1.76, 95% CI [1.50, 2.06], $p < .001$
4	Boffa et al. (2017), To identify whether PTSS are related to a history of SI and prior SA.	No specific event Firefighters (N = 893); United States	Web based self-report survey Self-Injurious thoughts and behaviors interview-short form (SITBI-SF)	Elevated PTSS were linked to higher risk of lifetime SI and prior SA.	IRR = 1.03, 95% CI [1.02, 1.04] (for SI) AOR = 1.05, 95% CI [1.02, 1.09] (for SA)

5	Boffa et al. (2018), To replicate Stanley, Hom, et al. (2017a) who examined the effect of Anxiety Sensitivity (AS) on the association between PTSS and increased suicide risk in female firefighters only.	All endorsed at least one traumatic event on the LEC-5 Trauma-exposed and nonzero suicide risk male career firefighters (N = 214); United States (a large metropolitan area in southern US)	Web based self-report survey SBQ-R (Nonzero suicide risk was defined as a score of more than 3)	Elevated AS cognitive concerns and PTSS were linked to elevated suicide risk. AS cognitive concerns mediated the relationship between PTSS and suicide risk; however, the reverse was also true.	R^2= .28, F[8,205] = 13.53, p < .001
6	Carleton et al. (2018), To assess past-year and lifetime SI, suicide plans (SP), and SA.	No specific event Public safety personnel (N = 5,148); Canada	Web based self-report survey Six developed yes/no questions which were intentionally aligned with precedent suicide items from Statistics Canada.	Overall, the amount of public safety personnel reporting suicidal behaviours (SB) was higher than reports from general population. *Past-year SB:* Age was inversely associated with past-year SI. Single, separated/divorced/widow	OR = 2.62, 95% CI [2.00, 3.43] (for women on lifetime SB)

ed more likely to report SB than married/common-law, as were Eastern Canadians compared to Western Canadians, and participants with less than 4 years college compared to those with university degrees/4 years college. No significant differences based on sex, ethnicity, urban versus rural, or years of service.

Lifetime SB: 30 years or older significantly less likely to report SB. Single, separated/divorced/widowed more likely to report SB than married/common-law, 10 years of service or more significantly less likely to report SB. Women reported significantly more SB than men. No significant differences based on geographical location,

				ethnicity, education, or urban versus rural.	
7	G. S. J. Carpenter et al. (2015), To assess whether social support moderates the association between firefighter stress and SI.	No specific event Career firefighters (N = 334); United States (three cities; Northeast, Southeast and Southwest US)	Survey completed at start of a training program (sample 1, N = 172) and at start of a treatment development study (sample 2, N = 162). Self-report questionnaires completed in group settings under supervision of a clinical psychologist. Ideation item on 2 similar measures of depression. Sample 1: Beck Depression Inventory for Primary Care (BDI-PC); sample 2: Beck Depression Inventory-II (BDI-II). Both scales use the same SI item.	No association between stress and SI was found when levels of social support were high; however, stress and SI were positively associated when peer social support was low.	$z = 1.98$, $p = .04$
8	T. P. Carpenter et al. (2020), To assess whether self-forgivingness influences the level of	No specific event Career firefighters (N = 72); United	Self-report questionnaires before psychoeducational workshop on stigma SBQ-R	Self-forgiveness was associated with less self-stigma and internalized stigma, but no link was found with public stigma. Self-forgiveness predicted	$R^2 = .33$, $p < .001$ (for depression) $R^2 = .35$, $p < .001$ (for PTSS)

	stigma and mental health challenges.	States and Canada		fewer depressive symptoms, PTSS and SI.	R^2 = .09, *ns* for SI
9	Chu et al. (2016), To test the propositions of the interpersonal theory of suicide.	No specific event Firefighters (N = 863); United States	Web based self-report survey SITBI-SF and Depressive Symptom Inventory-Suicidality Subscale (DSI-SS)	The three-way interaction between perceived burdensomeness, thwarted belongingness, and fearlessness about death was significantly associated with career SA, beyond sex. After accounting for years of service or age, the results were no longer significant. The two-way interaction between perceived burdensomeness and thwarted belongingness was not significantly associated to career SI severity.	OR = 1.00, 95% CI [1.00, 1.01] (for the three-way interaction association with career SA)
10	Chu et al. (2017), To evaluate TB as a link between insomnia and SI.	No specific event	Web based self-report survey	Severe insomnia was related to greater feelings of thwarted belongingness and SI, and thwarted belongingness accounted for the relationship	R^2 = .14, κ^2 = .19 (indirect effect of insomnia on SI through

		Firefighters (N = 858); United States	Beck Scale for Suicide Ideation (BSS)	between insomnia and SI. This finding remained significant even after accounting for anxiety.	thwarted belongingness)
11	De Barros et al. (2013), To assess the associations between mental health conditions, individual and job characteristics, and sleep disturbances.	No specific event Military career firefighters (N = 303); Brazil (Juiz de Fora - MG)	Self-report questionnaires in private room BSS	Psychological distress and psychosomatic disturbances were significantly associated with sleep disturbances. SI, unhealthy alcohol use, and years of service were also associated with sleep disturbances, but at a borderline level of significance.	OR = 2.21, 95% CI [1.14, 4.28], $p < .05$ (psychological distress and sleep disturbances) OR = 2.50, 95% CI [0.91, 3.25], $.05 < p > .085$ (SI and sleep disturbances)
12	Gallyer et al. (2018), Study 1: To examine the association between SI and problematic alcohol use.	No specific event Study 1: Firefighters (N	Web based self-report survey Study 1: DSI-SS	Study 1: More problematic alcohol use was significantly linked with more severe career SI via perceived burdensomeness,	Study 1: $B = 0.05$, $SE = 0.02$, 95% CI [0.02, 0.08] (for perceived burdensomeness)

	Study 2: To test whether perceived burdensomeness and thwarted belongingness serve as indirect indicators of this association.	= 944); United States Study 2: female firefighters (N = 241); United States	Study 2: SITBI-SF	but not thwarted belongingness. Study 2: Problematic alcohol use was linked with career SI via both perceived burdensomeness and thwarted belongingness**.**	Study 2: *B* = 0.07, *SE* = 0.04, 95% CI [0.02, 0.19] (for perceived burdensomeness) *B* = 0.09, *SE* = 0.04, 95% CI [0.03, 0.17] (for thwarted belongingness)
13	Groll et al. (2020), To investigate the link between prior military service and symptoms of mental health distress in public safety personnel.	No specific event Public safety personnel (N = 9,260, but not all responses complete); Canada	Web based self-report survey One question whether participants ever seriously contemplated, planned, or attempted suicide.	Ex-military public safety personnel reported significantly more exposure to PTEs and were approx. 1.5 times more likely to screen positive for PTSS, mood, anxiety, or acute stress disorders as well as SI compared to those without prior armed forces experience.	OR = 1.58, 95% CI [1.30, 1.93] (for prior military service contemplating suicide) OR = 1.33, 95% CI [0.93, 1.90] (for prior military service planning suicide)

					OR = 0.99, 95% CI [0.82, 1.19] (for prior military service attempting suicide)
14	Healy & Vujanovic (2021), To investigate the moderating effect of sleep disturbance on the relationship between PTSS and suicide risk in firefighters.	All endorsed at least one traumatic event on the LEC-5 Firefighters (N = 802); United States (a large metropolitan area in southern US)	Web based self-report survey SBQ-R	PTSS and sleep disturbance were each linked to elevated suicide risk; further, sleep disturbance moderated the relationship between PTSS and suicide by exacerbating the relationship.	ΔR^2 = .03, p < .001
15	Hom et al. (2017), To investigate whether a history of sexual and physical abuse is linked to career SI, SP and SA as well as current suicide risk.	History of sexual and physical abuse Firefighters (N = 929); United States	Web based self-report survey SITBI-SF and SBQ-R	A history of physical abuse alone, sexual abuse alone and of both abuses were all linked to elevated career SI, SP and SA as well as elevated current suicide risk.	AOR = 12.27, 95% CI [7.64, 19.71] (for SI) AOR = 27.41, 95% CI [16.92, 44.41] (for SP)

					AOR = 51.02, 95% CI [27.75, 93.81] (for SA)
16	Hom et al. (2019), To compare SA history and likelihood of future SA between attitudes towards suicides among firefighters.	History of career SA Firefighters (N = 818); United States	Web based self-report survey SITBI-SF	Career SA history was linked with elevated normalization of suicide; however, decreased attribution of suicide to isolation/depression. Elevated levels of suicide stigma and normalization were linked to an elevated likelihood of future SA.	R^2 = .48, partial r^2 = .01 (for suicide stigma) R^2 = .53, partial r^2 = .11 (for suicide normalization)
17	Hom, Stanley, Ringer, et al. (2016), To investigate rates and correlates of mental health service use, as well as barriers to care among firefighters with a history of SI, SP or SA.	History of SI, SP or SA Firefighters (N = 483); United States	Web based self-report survey SITBI-SF	Service use rates increased with severity of SB type. Barriers to care were concerns about reputation and embarrassment.	χ^2 = 9.82, df = 1, p = .002 (for plans compared to attempts) χ^2 = 36.02, df = 1, p < .001 (for ideation compared to attempts)

18	Hom et al. (2018b), To investigate rates of mental health service use and help-seeking, correlates of service use, and preferred sources of support among female firefighters with a career history of SI.	Career history of SI Female firefighters (N = 119); United States	Web based self-report survey SITBI-SF	Majority of female firefighters with a career history of SI used mental health services or other sources of support. A preference was found to be care from a psychologist, therapist and/or counsellor. While self-reported stigma was indicated as a potential barrier to care, findings showed it may not serve as a significant barrier.	No SI stats reported
19	Hom et al. (2018a), To investigate exposure to suicide and suicide bereavement with associated SI and psychiatric symptoms.	Suicide exposure and suicide bereavement Female firefighters (N = 266); United States	Web based self-report survey SITBI-SF and SBQ-R	Exposure to suicide was linked to elevated levels of SI and psychiatric symptoms. Furthermore, increased impact of suicidal death was linked to more severe current suicide risk.	$F(1,263) = 7.06$, $p = .008$, $\eta^2 = .03$ (Career suicide exposure on suicide risk) $R^2 = .05$, partial $r^2 = .05$ (for impact of suicide death on current suicide risk)

20	Hyun et al. (2020), To examine the relationship between emotional labour and SI.	Emotional labour Firefighters (N = 18,101); Korea	Web based self-report survey One question whether participants had thoughts about committing suicide in the past 12 months.	Experience of and exposure to chronic and excessive emotional labour might increase SI risk. The sub-scales of *overload and conflict of customer service* and *organisational surveillance and monitoring* were linked to double the SI risk than the normal group.	RR = 1.67, 95% CI [1.34, 2.07] (for *emotional demand and regulation* subscale) RR = 1.59, 95% CI [1.24, 2.03] (for *overload and conflict of customer service* subscale) RR = 2.41, 95% CI [1.95, 2.97] (for *emotional disharmony and hurt* subscale) RR = 2.21, 95% CI [1.83, 2.68] (for *organisational surveillance and monitoring* subscale)

					RR = 1.67, 95% CI [1.39, 2.00] (for *lack of supportive and protective system in the organisation* subscale)
21	Jones et al. (2018), To investigate duty-related risk factors and levels of mental health distress.	No specific event First responders (FR; firefighters and EMTs/paramedics; N = 220); United States (Arkansas)	Web based self-report survey SBQ-R	Elevated risk of mental health problems was linked to: being an FR, being female, working shifts of 48 hours or more, rural department compared to suburban, urban, and mixed, having a partner (relationship) and having a medical history of hypertension.	OR = 0.30, 95% CI [0.14, 0.68] (for female) OR = 0.21, 95% CI [0.51, 0.87] (for rural compared to suburban) OR = 0.21, 95% CI [0.08, 0.56] (for rural compared to urban) OR = 0.23, 95% CI [0.09, 0.57] (for rural

					compared to mixed) OR = 0.44, 95% CI [0.21, 0.91] (for non-partnered compared to relationship)
22	Kim, Oh et al. (2020), To examine the rates and clinical impairment of subthreshold PTSS in a sample of firefighters.	No specific event Firefighters (N = 45,698); South Korea	Web based self-report survey SBQ-R	The rate of probable sub-threshold PTSS was similar or higher than probable full-threshold PTSS. Lower than expected rates of depression (3.44%), SI (4.88%) and problematic alcohol use (17.46%) were reported. Sub-threshold PTSS was associated with elevated levels of depression, problematic alcohol use and SB.	*i* = 2.78, *p* <.0001, f^2 = 0.16 (probable full-threshold) *i* = 0.72, *p* < .0001, f^2 = 0.16 (probable sub-threshold)
23	Kim, Park, & Kim (2018), To investigate the mediating role of alcohol use disorder (AUD) and	No specific event	Web based self-report survey	The results showed 5.8% of firefighters experienced SI for several days, 0.5% for more than half the days, and	R^2 = .19

	insomnia in the relationship between PTSS and SI.	Firefighters (N = 7,190); South Korea (Gyeonggi province)	An item of the Korean version of Patient Health Questionnaire 9 (PHQ-9)	0.2% nearly every day for the past 2 weeks. 3.6% reported PTSS. AUDs and insomnia were significantly associated with SI (adjusted for demographics, PTEs and PTSS). PTSS also showed a positive association with SI (adjusted for demographics, PTEs, AUDs, and insomnia). Number of PTEs were significantly associated with SI, but this association was diminished after being adjusted for PTSS.	
24	Kimbrel et al. (2016), To investigate the link between cumulative exposure to SA and deaths and SB in firefighters.	Cumulative exposure Career firefighters (N = 61); United States	Self-report questionnaires as part of Standard Operating Procedure (SOP) development study. SBQ-R	Firefighters experienced elevated rates of exposure to SA and suicide deaths (100% of firefighters in present study). Further, they experienced an elevated number of SA and deaths (M = 13.1), which is linked to an elevated risk of SB. Firefighters with 12+	27.8% vs. 5.3%; χ^2 = 5.66, p = .017 (positive screen on SBQ-R for 12+ PTEs)

				exposures were more likely to report SB.	
25	Kyron, McEvoy et al. (2021), To investigate the link between sexual orientation and mental health of emergency services personnel.	No specific event Emergency services personnel (N = 14,536 – *Fire & Rescue N = 2,975*); Australia	Web based self-report survey Six yes/no questions regarding SI, SP and SA, derived from 2007 National Survey of Mental Health and Wellbeing	Firefighters with a bi-/pansexual orientation, or who were unsure of their sexual orientation were at higher risk of experiencing SI and SP than heterosexual participants, while LGBT+ participants were at higher risk of lifetime SP and six times more likely to report lifetime SA than heterosexual participants.	OR = 3.58, 95% CI [2.3, 5.5], $p <$ .001
26	Kyron et al. (2020), To investigate the effect of nondisclosure of SI on the mental health of emergency services personnel.	No specific event Emergency services personnel (N = 14,536 – *Fire & Rescue N = 2,975*); Australia	Web based self-report survey Six yes/no questions regarding SI, SP and SA, derived from 2007 National Survey of Mental Health and Wellbeing	Participants who nondisclosed regarding SB showed elevated rates of psychological distress and PTSS, lower wellbeing and social support than those who reported SI. Nondisclosing participants reported high degrees of stigma within their workplace regarding mental	$F(2, 14530) = 1231.25$, $p <$ .001, $\eta^2 = .15$ (psychological distress when non-disclosing compared to reporting SI)

				health distress and career consequences.	
27	Kyron, Rikkers, et al. (2021),To examine rates of SI and SB as well as personal and working environment risk and protective factors in emergency services personnel	No specific event Emergency services personnel (N = 14,868 – *Fire & Rescue N = 2,975*); Australia	Web based self-report survey Six yes/no questions regarding SI, SP and SA, derived from 2007 National Survey of Mental Health and Wellbeing	Emergency services personnel reported elevated rates of SI and SP, but not SA than general population. Being male, single/divorced, nonheterosexual or longer serving were found to be risk factors SI and SB. Perceived stigma, work on life impact and low meaning of work were linked to SI. Bullying significantly differentiated those who experienced SP and SA from those with SI only, while PTSS significantly differentiated those who experienced SP and drug misuse and psychological distress those who reported SA from those who reported SI only. Higher resilience	$\chi^2(1, 23{,}709) = 95.63$, $p < .001$ (for SI rates in personnel compared to general population) OR = 0.61, 95% CI [0.54, 0.70], $p < .001$ (for higher social support linked to lower SI)

				and social support were linked to lower SI.	
8	Martin, Tran, et al. (2017), To examine the specific correlates of SI in a firefighter/emergency medical services (EMS) sample.	No specific event Career firefighters/EMS personnel (N = 3,036); United States (a major metropolitan city in Southwestern US)	Self-report questionnaires as part of department-wide suicide prevention program developed by the department's psychologist Two items; "*Have you ever seriously considered suicide before joining the department?*" and "*Have you ever seriously considered suicide since joining the department?*"	Depression and PTSS were linked with lifetime SI and SA. Years of service were not found to be significantly differential to lifetime SI.	R^2 = .18 (for SI), p < .001
29	Martin, Vujanovic, et al. (2017), To examine the indirect effects of alcohol dependence on SI via both depression and PTSS	Career male firefighters/EMS personnel (N = 2,883); United States (a major metropolitan city in Southwestern US)	Self-report questionnaires as part of department-wide suicide prevention program developed by the department's psychologist Suicide Risk Questionnaire (SRQ) developed for this study. 19 items relating to SI, SA, and family history of SA/death	Alcohol dependence was linked to suicide risk. Furthermore, there was a significant indirect link of alcohol dependence on suicide risk via depressive symptoms as well as via PTSS.	R^2 = .04 (for alcohol dependence on suicide risk) β = 0.16, 95% CI [0.15, 0.18], p < .001 (for the indirect link)

30	Noor et al. (2019), To examine the personal, work environment and mental health characteristics linked to PTSS and lifetime SI in female compared to male firefighters.	No specific event Career firefighters (N = 75 female and 2,564 male); United States (a major urban city in Southwestern US)	Self-report questionnaires as part of department-wide suicide prevention program developed by the department's psychologist Questions whether participants had considered or attempted suicide before or after joining the force (or both)	Female firefighters were at elevated risk of PTSS and SI compared to male. Mental health variables (such as depression, general stress and having seen a mental health professional) were linked to PTSS and SI for both sexes. Substance abuse was linked to SI, only in men.	73% versus 58%; $\chi^2 = 6.02$, $p < .05$ (being single on SI) 68% versus 38%; $\chi^2 = 5.79$, $p < .05$ (second job on SI) 41% versus 11%; $\chi^2 = 8.51$, $p < .01$ (received counseling on SI)
31	Park et al. (2019), To examine the 1-year rate of SI in firefighters as well as the correlates among demographic, occupational and clinical characteristics.	No specific event Career firefighters (N = 45,698); South Korea	Web based self-report survey An item of the SBQ-R (Item 2)	10.66% of Korean firefighters reported past year SI compared to the 2016 figure of 2.9% of the general Korean population. PTSS and depressive symptoms were most strongly associated with SI. After controlling for these effects, occupational characteristics associated with SI were recent exposure to PTE,	OR = 1.85, 95% CI [1.71, 2.00], $p < .001$ (for recent exposure to PTE)

				occupational stress, emotional labour, and officer position as present job. Being female elevated SI risk as well.	
32	Pennington et al. (2021), To examine sociodemographics and risk factors of firefighter and nonfirefighter decedents.	Suicide Firefighters (N = 722) and nonfirefighters (N = 192,430) decedents; United States	Examination of data from the National Violent Death Reporting System (NVDRS) History of SI or SA, disclosed suicide intent or left suicide note	Firefighters were found to be more likely to die by firearm than nonfirefighters. Firefighter decedents were less likely to have been diagnosed with depression, but more likely with PTSS; they showed an elevated likelihood of relationship or health problem prior to death, but lower likelihood of SI and SA.	Cramer's V = 0.01, $p < .001$ (for PTSS) Cramer's V = 0.01, $p < .001$ (for relationship problems)
33	Roberts (2019), To examine variables associated with suicide in law enforcement, army, and firefighters.	Suicide Law enforcement (N = 299), army (N = 420) and firefighters (N	Examination of data from the NVDRS SI not examined	Six variables were associated with suicide across all three samples: treatment for a mental health condition, PTSS, alcohol and substance misuse, occupational	$\chi^2 = 19.59$, $p < .001$, Cramer's V = 0.15 (for PTSS)

		= 151); United States		problems, and intimate partner problems. Firefighters and army suicides were less likely to be associated with occupational problems, and suicide by female less likely than law enforcement officers.	
34	Serrano et al. (2020), To examine the relationship between sleep disturbances and suicide risk and the effect of mindfulness on this relationship.	No specific event Career firefighters (N = 865); United States (a large city in southern US)	Web based self-report survey SBQ-R	Elevated levels of sleep disturbances were associated with elevated suicide risk, after controlling for occupational stress, trauma load, and anxiety and depressive symptoms. The mindfulness facets of acting with awareness and nonjudging of inner experiences as well as overall mindfulness significantly reduced the relationship between sleep disturbances and suicide risk, while the mindfulness facet of observing	$\Delta R^2 = 0.03$, $p < .001$ (association of sleep disturbance with suicide risk) $\Delta R^2 = 0.01$, $p < .05$ (overall mindfulness)

				strengthened the relationship.	
35	Stanley, Boffa, et al. (2017), To examine differences in psychiatric symptoms and barriers to mental health care between volunteer and career firefighters.	No specific event Firefighters (N = 525); United States	Web based self-report survey SITBI-SF and SBQ-R	Volunteer firefighters reported significantly higher levels of depression, PTSS and SI, while career firefighters reported relatively higher levels of problematic alcohol use. Volunteers also reported elevated structural barriers to mental health care, while these barriers accounted for the differences in mental health variables between volunteer and career firefighters.	$F(1, 515) = 5.74$, $p = .017$, $\eta_p^2 = .01$ (SI in volunteer compared to career) $F(1, 515) = 22.96$, $p < .001$, $\eta_p^2 = .04$ (structural barriers for volunteer compared to career)
36	Stanley, Boffa, et al. (2018), To examine the link between occupational stress and multiple indicators of suicide risk as well as the moderation of distress tolerance on this link.	No specific event Career firefighters (N = 831); United States (a large metropolitan	Web based self-report survey SBQ-R	High levels of distress tolerance were found to decrease the effects of occupational stress on suicide risk, as well as lifetime suicide threats and current suicide intent.	$F(7,823) = 25.33$, $p < .001$, $R^2 = .18$, $f^2 = 0.22$ (suicide risk)

		area in southern US)			
37	Stanley et al. (2019), To examine the effect of mindfulness on the relationship between PTSS and increased suicide risk in firefighters.	No specific event Career firefighters (N = 831); United States (a large metropolitan area in southern US)	Web based self-report survey SBQ-R	Elevated PTSS was associated with elevated suicide risk. Higher levels of the mindfulness facets of acting with awareness and nonjudging of inner experiences significantly reduced this association, while higher levels of the mindfulness facet of observing strengthened the association.	$F(6,824) = 38.52$, $p < .001$, $R^2 = .22$, $f^2 = 0.28$ (awareness) $F(6,824) = 41.83$, $p < .001$, $R^2 = .23$, $f^2 = 0.31$ (nonjudging)
38	Stanley, Hom, et al. (2018), To examine the difference in suicide risk between wildland and nonwildland firefighters as well as to examine the influence of thwarted belongingness and perceived burdensomeness on this difference.	No specific event Firefighters (N = 1,131, wildland: N = 20); United States	Merged data from two nationwide investigations of firefighter mental health; web based self-report survey SBQ-R	Wildland firefighters reported elevated levels of suicide risk. This link between wildland firefighter status and suicide risk was statistically explained by thwarted belongingness, but not perceived burdensomeness.	$\chi^2 = 4.72$, $p = .030$ (wildland firefighters) $B = 0.061$, $SE = 0.001$, $p < .001$, 95% CI [0.05, 0.72] (indirect effect of thwarted belongingness)

39	Stanley et al. (2020), To examine SA rates among American Indian/Alaska Native (AI/AN) firefighters and determine whether greater exposure to PTEs and/or fearlessness about death explains the relationship between AI/AN identity and SB.	No specific event Firefighters (N = 917, AI/AN: N = 57); United States	Web based self-report survey SITBI-SF	Controlling for years of service as firefighter, AI/AN firefighters were 16.31 times more likely to report a career SA history. PTEs, but not fearlessness about death, was a significant mediator of the relationship.	Cox & Snell R^2 = .27, R^2N = .48 (for the indirect effect of race/ethnicity on suicide risk, medicated by PTEs)
40	Stanley et al. (2015), To examine the career levels of SI, SP, SA, and nonsuicidal self-injury (NSSI) among firefighters.	No specific event Firefighters (N = 1,027); United States	Web based self-report survey SITBI-SF	Elevated rates of career levels of SI, SP, SA, and NSSI were found. Risk factors for SI and SB were lower firefighter rank, fewer years of service, membership in an all-volunteer department, a history of professionally responding to a SA or death, and active-duty military status.	r = -.03, p < .001 (years of service) OR = 2.73, 95% CI [1.62, 4.61] (SI with history of responding to suicide attempt) OR = 1.71, 95% CI [1.16, 2.51] (SI with history of responding to suicide death)

41	Stanley, Hom, et al. (2017b), To describe and compare precareer and career rates of SI and SB among women firefighters.	No specific event Female firefighters (N = 313); United States	Web based self-report survey SITBI-SF	Female firefighters reported elevated rates of SI and SB. Precareer rates of SI and SB were significantly linked to career SI and SB.	OR = 4.76, 95% CI [2.82, 8.03] (precareer rates of SI linked to career SI)
42	Stanley, Hom, et al. (2017a), To examine the effect of Anxiety Sensitivity (AS) on the association between PTSS and increased suicide risk.	No specific event Female firefighters (N = 254); United States	Web based self-report survey SBQ-R	Global and cognitive AS concerns, but not physical or social AS concerns, were significant mediators of the association between PTSS and suicide risk.	R^2 = .41, F(3250) = 58.77, p < .001 (PTSS and suicide risk relationship) B = 0.004, SE = 0.003, 95% CI [0.0002, 0.0124] (global AS concerns as mediator)
43	Stanley, Smith, et al. (2018), To investigate the depression-distress amplification model	No specific event Career firefighters (N = 831); United States (a large	Web based self-report survey SBQ-R	Effects of elevated depression symptoms on increased suicide risk are amplified when AS cognitive concerns or AS social concerns are elevated. No interaction	$F($3827) = 44.55, p < .001, R^2 = .14, f^2 = 0.16; ΔR^2 = 0.02, p < .001 (effect of the interaction between

		metropolitan area in southern US)		between depression symptoms and AS physical concerns was found.	depression and cognitive AS on suicide risk)
44	Streeb et al. (2019), To investigate the combination of IPTS and Social Cognitive Theory (SCT) in explaining SB.	No specific event Career firefighters (N = 216); United States	Web based self-report survey Questions regarding past SI, SI during firefighter career as well as plans, means and attempts.	Social support from significant others was found to moderate the indirect effect between PTEs and the IPTS factors through self-regulation.	*B* = .04, *SE* = .02, 95% CI [.01, .09] (for indirect effect of PTEs on Thwarted Belongingness when social support was high) *B* = .01, *SE* = .01, 95% CI [.01, .02] (for indirect effect of PTEs on Perceived Burdensomeness when social support was high) *B* = -.02, *SE* = .01, 95% CI [-.06, -

					.01] (for indirect effect of PTEs on Fearlessness about death when social support was high)
45	Tiesman et al. (2015), To compare suicides in workplaces and nonworkplaces between 2003 and 2010.	Suicide Workplace (N = 1,719) and nonworkplace decedents (N = 270,500); Unites States	Examination of data from the Census of Fatal Occupational Injury database and the Web-Based Injury Statistics Query and Reporting System SI not examined	Workplace suicides decreased until 2007 and then sharply increased, while nonworkplace suicides increased steadily. Risk factors for workplace suicide were gender (male), age (over 65) and workplace (protective service).	RR = 15.3, 95% CI [12.1, 18.5] (for males) RR = 3.7, 95% CI [2.6, 4.8] (for over 65) No stats reported for workplace

46	Violanti (2010), To compare police, firefighter, and military suicide rates.	Suicide Police (N = 1,148), military (N = 1,993) and firefighters (N = 283); United States	Examination of data from the National Occupational Mortality Surveillance (NOMS) (1984-1998) SI not examined	Police suicide rate was four times that of firefighters. Ethnic minority officers had 4.5 times and female police officers had 12 times the suicide rate of firefighters.	Only Proportionate Mortality Ratios for suicide reported

Appendix B. Ethics Approval

MASSEY UNIVERSITY

Date: 11 December 2020

Dear Jeannette Bertram

Re: Ethics Notification - **SOB 20/54 - The impact of cumulative trauma and self-regulation on PTSI, depression and suicidal ideation in a sample of New Zealand firefighters.**

Thank you for the above application that was considered by the Massey University Human Ethics Committee: **Human Ethics Southern B Committee** at their meeting held on **Friday, 11 December.**

Approval is for three years. If this project has not been completed within three years from the date of this letter, reapproval must be requested.

If the nature, content, location, procedures or personnel of your approved application change, please advise the Secretary of the Committee.

Yours sincerely

Professor Craig Johnson
Chair, Human Ethics Chairs' Committee and Director (Research Ethics)

Research Ethics Office, Research and Enterprise
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Appendix C. Information Sheet

MASSEY UNIVERSITY
TE KUNENGA KI PŪREHUROA
UNIVERSITY OF NEW ZEALAND

Posttraumatic Stress Injury, depression, and suicidal ideation in New Zealand firefighters.
Information Sheet

We are seeking to assess Posttraumatic Stress Injury, depression, and suicidal ideation in New Zealand firefighters. Our aims are to find out how many New Zealand firefighters are impacted by Posttraumatic Stress Injury, depression and suicidality and what factors play a role in the development and improvement of these psychological injuries.

Who is doing this research?
Kia ora, my name is Jeannette Bertram. I am originally from the Netherlands and have lived in the beautiful valley of the Wairarapa for 10 years now. I am married and have three children. My husband and I are both firefighters at the Carterton Volunteer Fire Brigade.
I am a Doctor of Clinical Psychology Student at Massey University, under the supervision of Doctor Ian de Terte and Professor Janet Leathem.

What is involved?
Completing the survey will take approximately 20 minutes. Your responses will contribute to research evaluating the impact of cumulative trauma and self-regulation on Posttraumatic Stress Injury, depression, and suicidality in New Zealand firefighters. You will be asked to indicate whether or not you have had traumatic experiences.

Click on the next button at the bottom of this page which will take you to the survey. Thank you for taking the time to complete this survey.

Who can participate?
You need to be older than 16 years of age, and a current or retired firefighter in New Zealand.

Your rights as a participant:
You are under no obligation to accept this invitation. If you decide to participate, completion and submission of the questionnaire implies consent. You have the right to decline to answer any particular question. You are under no obligation to complete the survey and can withdraw at any time. In order to protect your privacy, the survey is anonymous.

Data resulting from this research will be securely stored at Massey University for 5 years, after which it will be destroyed. The information you provide will be used in my Doctoral thesis and submitted for assessment, and the findings may be published in scientific journals or presented at scientific conferences in New Zealand and overseas.

Contact information:
If you have any further questions, please feel free to contact the researcher or supervisor. A detailed report outlining the findings of this research study will be available to all participants, on request, once the study is complete.

Jeannette Bertram – Doctor of Clinical Psychology Student and Lead Researcher
Email: Jeannette.Bertram.1@uni.massey.ac.nz

Doctor Ian de Terte – Primary supervisor
Email: I.deTerte@Massey.ac.nz

Professor Janet Leathem – Secondary supervisor
Email: J.M.Leathem@Massey.ac.nz

This project has been reviewed and approved by the Massey University Human Ethics Committee: Southern B, Application SOB 20/54. If you have any concerns about the conduct of this research, please contact Dr Gerald Harrison, Chair, Massey University Human Ethics Committee: Southern B, telephone 06 356 9099 x 83570, email humanethicsouthb@massey.ac.nz

Appendix D. Survey

Consent I have read and understood the information sheet for this study and consent to collection of my responses.
(Please click on the 'Yes' choice if you wish to proceed.)

- ○ Yes (1)
- ○ No (2)

Warning **The impact of cumulative trauma and self-regulation on PTSS, depression, and suicidal ideation in a sample of New Zealand firefighters.**

Completing the survey will take approximately 20 minutes. Your responses will contribute to research evaluating the impact of traumatic events and self-regulation on PTSS, depression, and suicidal ideation in New Zealand firefighters.

Warning: This survey contains content about suicide that may be distressing for some.

Help **Where to get help:** **1737** - Free call or text 1737 (24/7) **What's Up** - Call 0800 WHATS UP (0800 942 8787) **Lifeline** - Call 0800 LIFELINE (0800 543 354) (24/7) **Samaritans** - Call 0800 726 666 (24/7 Crisis helpline) **Depression Helpline** - Call 0800 111 757 (24/7) **Suicide Crisis Helpline** - Call 0508 TAUTOKO (0508 828 865) (24/7)
FENZ services: Vitae Services Region 1, 2, 3 - Call 0508 664 981 EAP Services Region 4 and 5 - Call 0800 327 669 or call your Communication Centre who can put you in touch with a Peer Support person or Safety, Health and Wellbeing Advisor in your region. You can do this without giving your name.

Contact details of the researchers:
Jeannette Bertram – Doctor of Clinical Psychology Student and Lead Researcher
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Doctor Ian de Terte – Primary supervisor
Email: I.deTerte@Massey.ac.nz

Professor Janet Leathem – Secondary supervisor
Email: J.M.Leathem@Massey.ac.nz

Screening block:

Sc1 In which country do you currently reside?

- ○ New Zealand (123)

Sc2 Are you a firefighter?

- ○ Yes, I am a current firefighter (1)
- ○ Yes, I am a retired firefighter (2)
- ○ No, I am not a firefighter (3)

Sc3 What year were you born in?

1920 - 2019

Occupational Characteristics:

OC1 Are you a volunteer or career firefighter?

- ○ Volunteer (1)
- ○ Career (2)

OC2 What is your rank with FENZ?

- ○ Operational Support Firefighter (1)
- ○ Recruit Firefighter (2)
- ○ Firefighter (3)
- ○ Qualified Firefighter (4)
- ○ Senior Firefighter (5)
- ○ Station Officer (6)
- ○ Senior Station Officer (7)
- ○ Deputy Chief Fire Officer (8)
- ○ Chief Fire Officer (9)
- ○ Other: (10) _____

OC3 What year did you join Fire and Emergency New Zealand (FENZ)?

_____

OC4 Is your brigade in an urban or rural location?

- ○ Urban (1)
- ○ Rural (2)
- ○ Other: (3) _____

OC5 What is the average number of calls your brigade attends in a **week**?

- ○ 0-5 calls (1)
- ○ 6-10 calls (2)
- ○ 11-15 calls (3)
- ○ 16-20 calls (4)
- ○ 21-25 calls (5)
- ○ More than 25 calls (6)

OC6 **Potentially traumatic events** are powerful and upsetting incidents that intrude into daily life. They are usually experiences which are life threatening or pose a significant threat to a person's physical or psychological wellbeing. An event may have little impact on one

person but cause severe distress in another.
How many potentially traumatic events have you attended since joining FENZ?

- ○ 0 (0)
- ○ 1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 (4)
- ○ 5 (5)
- ○ 6 (6)
- ○ 7 (7)
- ○ 8 (8)
- ○ 9 (9)
- ○ 10 (10)
- ○ More than 10 (11)

LECa **Instructions:**

Listed below are a number of difficult or stressful things that sometimes happen to people. For each event check one or more of the boxes to the right to indicate that: it happened to you personally; you witnessed it happen to someone else; you learned about it happening to a close family member or close friend; you were exposed to it as part of your job (for example, paramedic, police, military, or other first responder); you're not sure if it fits; or it doesn't apply to you. Be sure to consider your entire life (growing up as well as adulthood) as you go through the list of events.

	(a) Happened to me (1)	(b) Witnessed it (2)	(c) Close family or friend (3)	(d) Part of the job (4)	(e) Not sure (5)	(f) Does not apply (6)
Natural disaster (for example, flood, hurricane, tornado, earthquake) (LEC_1)	☐	☐	☐	☐	☐	☐
Fire or explosion (LEC_2)	☐	☐	☐	☐	☐	☐
Transportation accident (for example, car accident, boat accident, train wreck, plane crash) (LEC_3)	☐	☐	☐	☐	☐	☐
Serious accident at work, home, or during recreational activity (LEC_4)	☐	☐	☐	☐	☐	☐
Exposure to toxic substance (for example, dangerous chemicals, radiation) (LEC_5)	☐	☐	☐	☐	☐	☐

Physical assaults (for example, being attacked, hit, slapped, kicked, beaten up) (LEC_6)	☐	☐	☐	☐	☐	☐
Assault with a weapon (for example, being shot, stabbed, threatened with a knife, gun, bomb) (LEC_7)	☐	☐	☐	☐	☐	☐
Sexual assault (rape, attempted rape, made to perform any type of sexual act through force or threat of harm) (LEC_8)	☐	☐	☐	☐	☐	☐

LECb **Instructions:**
Listed below are a number of difficult or stressful things that sometimes happen to people. For each event check one or more of the boxes to the right to indicate that: it happened to you personally; you witnessed it happen to someone else; you learned about it happening to a close family member or close friend; you were exposed to it as part of your job (for example, paramedic, police, military, or other first responder); you're not sure if it fits; or it doesn't apply to you. Be sure to consider your entire life (growing up as well as adulthood) as you go through the list of events.

	(a) Happened to me (1)	(b) Witnessed it (2)	(c) Close family or friend (3)	(d) Part of the job (4)	(e) Not sure (5)	(f) Does not apply (6)
Other unwanted or uncomfortable sexual experience (LEC_9)	☐	☐	☐	☐	☐	☐

Combat or exposure to a war-zone (in the military or as a civilian) (LEC_10)	☐	☐	☐	☐	☐	☐
Captivity (for example, being kidnapped, abducted, held hostage, prisoner of war) (LEC_11)	☐	☐	☐	☐	☐	☐
Life-threatening illness or injury (LEC_12)	☐	☐	☐	☐	☐	☐
Severe human suffering (LEC_13)	☐	☐	☐	☐	☐	☐
Sudden violent death (for example, homicide, suicide) (LEC_14)	☐	☐	☐	☐	☐	☐
Sudden accidental death (LEC_15)	☐	☐	☐	☐	☐	☐
Serious injury, harm, or death you caused to someone else (LEC_16)	☐	☐	☐	☐	☐	☐
Any other very stressful event or experience (LEC_17)	☐	☐	☐	☐	☐	☐

PTSD_Event Please think about the events that you have experienced in your lifetime and consider which event from the previous list was the worst, most distressing event.
If more than one of these events happened to you, select the one event that currently causes you the most distress.
Could you please briefly describe the event below:

_____

_____

_____

PCL5a **Instructions:**
Below is a list of problems that people sometimes have in response to a very stressful experience.
Keeping the worst event you just described in mind, please read each problem carefully and then select one of the options to the right to indicate how much you have been bothered by that problem in the past month.
In the past **month**, how much were you bothered by:

	Not at all (0)	A little bit (1)	Moderately (2)	Quite a bit (3)	Extremely (4)
Repeated, disturbing, and unwanted memories of the stressful experience? (PCL5_1)	○	○	○	○	○
Repeated, disturbing dreams of the stressful experience? (PCL5_2)	○	○	○	○	○
Suddenly feeling or acting as if the stressful experience were actually happening again (as if you were	○	○	○	○	○

actually back there reliving it)? (PCL5_3)					
Feeling very upset when something reminded you of the stressful experience? (PCL5_4)	○	○	○	○	○
Having strong physical reactions when something reminded you of the stressful experience (for example, heart pounding, trouble breathing, sweating)? (PCL5_5)	○	○	○	○	○
Avoiding memories, thoughts, or feelings related to the stressful experience? (PCL5_6)	○	○	○	○	○
Avoiding external reminders of the stressful experience (for example, people, places, conversations, activities, objects, or situations)? (PCL5_7)	○	○	○	○	○

Trouble remembering important parts of the stressful experience? (PCL5_8)	○	○	○	○	○
Having strong negative beliefs about yourself, other people, or the world (for example, having thoughts such as: I am bad, there is something seriously wrong with me, no one can be trusted, the world is completely dangerous)? (PCL5_9)	○	○	○	○	○
Blaming yourself or someone else for the stressful experience or what happened after it? (PCL5_10)	○	○	○	○	○

PCL5b **Instructions:**

Below is a list of problems that people sometimes have in response to a very stressful experience.

Keeping the worst event you just described in mind, please read each problem carefully and then select one of the options to the right to indicate how much you have been bothered by

that problem in the past month.

In the past **month**, how much were you bothered by:

	Not at all (0)	A little bit (1)	Moderately (2)	Quite a bit (3)	Extremely (4)
Having strong negative feelings such as fear, horror, anger, guilt, or shame? (PCL5_11)	○	○	○	○	○
Loss of interest in activities that you used to enjoy? (PCL5_12)	○	○	○	○	○
Feeling distant or cut off from other people? (PCL5_13)	○	○	○	○	○
Trouble experiencing positive feelings (for example, being unable to feel happiness or have loving feelings for people close to you)? (PCL5_14)	○	○	○	○	○
Irritable behavior, angry outbursts, or acting aggressively? (PCL5_15)	○	○	○	○	○
Taking too many risks or doing things that could cause you	○	○	○	○	○

harm? (PC5L_16)					
Being “superalert” or watchful or on guard? (PCL5_17)	○	○	○	○	○
Feeling jumpy or easily startled? (PCL5_18)	○	○	○	○	○
Having difficulty concentrating? (PCL5_19)	○	○	○	○	○
Trouble falling or staying asleep? (PCL5_20)	○	○	○	○	○

Halfway You have completed half the survey - thank you so much 😊 – There are about 10 minutes to go!

PHQ Over the last 2 weeks, how often have you been bothered by any of the following problems?

	Not at all (0)	Several days (1)	More than half the days (2)	Nearly every day (3)
Little interest or pleasure in doing things (PHQ_1)	○	○	○	○
Feeling down, depressed, or hopeless (PHQ_2)	○	○	○	○
Trouble falling or staying asleep, or sleeping too much (PHQ_3)	○	○	○	○

Feeling tired or having little energy (PHQ_4)	○	○	○	○
Poor appetite or overeating (PHQ_5)	○	○	○	○
Feeling bad about yourself - or that you are a failure or have let yourself or your family down (PHQ_6)	○	○	○	○
Trouble concentrating on things, such as reading the newspaper or watching television (PHQ_7)	○	○	○	○
Moving or speaking so slowly that other people could have noticed. Or the opposite - being so fidgety or restless that you have been moving around a lot more than usual (PHQ_8)	○	○	○	○
Thoughts that you would be better off dead, or of hurting yourself (PHQ_9)	○	○	○	○

PHQ_10 If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

- Not difficult at all (0)
- Somewhat difficult (1)
- Very difficult (2)
- Extremely difficult (3)

The following questions ask about your thoughts and feelings of suicide ideation and suicidal behaviors. Please read them carefully and respond as accurately as you can.

If you experience extreme levels of distress, please contact Need to Talk? Free call or text 1737 any time to speak to a trained counselor, for any reason.

Or contact any of the below organisations to get help: What's Up - Call 0800 WHATS UP (0800 942 8787) Lifeline - Call 0800 LIFELINE (0800 543 354) (24/7) Samaritans - Call 0800 726 666 (24/7 Crisis helpline) Depression Helpline - Call 0800 111 757 (24/7) Suicide Crisis Helpline - Call 0508 TAUTOKO (0508 828 865) (24/7)

FENZ services: Vitae Services Region 1, 2, 3 - Call 0508 664 981 EAP Services Region 4 and 5 - Call 0800 327 669
or call your Communication Centre who can put you in touch with a Peer Support person or Safety, Health and Wellbeing Advisor in your region. You can do this without giving your name.

Block SI Current firefighters:

SITBI_C1 Since becoming a firefighter, have you ever had thoughts of killing yourself?

- ○ Yes (1)
- ○ No (2)

SITBI_C2 Since becoming a firefighter, have you ever actually made a plan to kill yourself?

- ○ Yes (1)
- ○ No (2)

SITBI_C3 Since becoming a firefighter, have you ever made an actual attempt to kill yourself in which you had at least some intent to die?

- ○ Yes (1)
- ○ No (2)

SITBI_C4 Since becoming a firefighter, have you ever actually engaged in non-suicidal self-injury?

- ○ Yes (1)
- ○ No (2)

If you experience extreme levels of distress, please contact Need to Talk? Free call or text 1737 any time to speak to a trained counselor, for any reason.

Or contact any of the below organisations to get help: What's Up - Call 0800 WHATS UP (0800 942 8787) Lifeline - Call 0800 LIFELINE (0800 543 354) (24/7) Samaritans - Call 0800 726 666 (24/7 Crisis helpline) Depression Helpline - Call 0800 111 757 (24/7) Suicide Crisis Helpline - Call 0508 TAUTOKO (0508 828 865) (24/7)

FENZ services: Vitae Services Region 1, 2, 3 - Call 0508 664 981 EAP Services Region 4 and 5 - Call 0800 327 669
or call your Communication Centre who can put you in touch with a Peer Support person or Safety, Health and Wellbeing Advisor in your region. You can do this without giving your name.

Block SI Retired firefighters:

SITBI_R1 Thinking about your time while serving as a firefighter, did you ever have thoughts of killing yourself?

- ○ Yes (1)
- ○ No (2)

SITBI_R2 Thinking about your time while serving as a firefighter, did you ever actually make a plan to kill yourself?

- ○ Yes (1)
- ○ No (2)

SITBI_R3 Thinking about your time while serving as a firefighter, did you ever make an actual attempt to kill yourself in which you had at least some intent to die?

- ○ Yes (1)
- ○ No (2)

SITBI_R4 Thinking about your time while serving as a firefighter, did you ever actually engage in non-suicidal self-injury?

- ○ Yes (1)
- ○ No (2)

If you experience extreme levels of distress, please contact Need to Talk? Free call or text 1737 any time to speak to a trained counselor, for any reason.

Or contact any of the below organisations to get help: What's Up - Call 0800 WHATS UP (0800 942 8787) Lifeline - Call 0800 LIFELINE (0800 543 354) (24/7) Samaritans - Call 0800 726 666 (24/7 Crisis helpline) Depression Helpline - Call 0800 111 757 (24/7) Suicide Crisis Helpline - Call 0508 TAUTOKO (0508 828 865) (24/7)

FENZ services: Vitae Services Region 1, 2, 3 - Call 0508 664 981 EAP Services Region 4 and 5 - Call 0800 327 669
or call your Communication Centre who can put you in touch with a Peer Support person or Safety, Health and Wellbeing Advisor in your region. You can do this without giving your name.

BSCS Using the scale provided, please indicate how much each of the following statements reflects how you typically are.

	Not at all (1)	A little (2)	A moderate amount (3)	A lot (4)	Very much (5)
I am good at resisting	○	○	○	○	○

temptation. (BSCS_1)					
I have a hard time breaking bad habits. (BSCS_2)	○	○	○	○	○
I am lazy. (BSCS_3)	○	○	○	○	○
I say inappropriate things. (BSCS_4)	○	○	○	○	○
I do certain things that are bad for me, if they are fun. (BSCS_5)	○	○	○	○	○
I refuse things that are bad for me. (BSCS_6)	○	○	○	○	○
I wish I had more self-discipline. (BSCS_7)	○	○	○	○	○
People would say that I have iron self-discipline. (BSCS_8)	○	○	○	○	○
Pleasure and fun sometimes keep me from getting work done. (BSCS_9)	○	○	○	○	○
I have trouble concentrating. (BSCS_10)	○	○	○	○	○
I am able to work effectively	○	○	○	○	○

toward long-term goals. (BSCS_11)					
Sometimes I can't stop myself from doing something, even if I know it is wrong. (BSCS_12)	○	○	○	○	○
I often act without thinking through all the alternatives. (BSCS_13)	○	○	○	○	○

Demographic characteristics:

D1 What terms do you use to describe your gender identity?

- ○ Male (1)
- ○ Female (2)
- ○ Non-binary (3)
- ○ Other: (4) _____
- ○ Prefer not to answer (5)

D2 In which occupation are you employed?

- ○ Emergency Services (1)
- ○ Managers (2)
- ○ Professionals (3)
- ○ Technicians and Trades Workers (4)
- ○ Community and Personal Service Workers (5)
- ○ Clerical and Administrative Workers (6)
- ○ Sales Workers (7)

- ○ Machinery Operators and Drivers (8)
- ○ Labourers (9)

D3 What is the highest level of school you have completed or the highest degree you have received?

- ○ Less than year 13 (1)
- ○ Year 13 (3)
- ○ Skilled trade apprenticeship (4)
- ○ Bachelor's degree (5)
- ○ Honour's degree (6)
- ○ Master's degree (7)
- ○ Doctoral degree (8)

D4 What is your marital status?

- ○ Single (1)
- ○ In a relationship (2)
- ○ Married/Cohabiting (3)

- ○ Divorced/Separated (4)
- ○ Widowed (5)

D5 How many people are in your household?

- ○ 1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 (4)
- ○ 5 (5)
- ○ 6 (6)
- ○ More than 6 (7)

D6 What ethnicity do you identify with?

- ○ Māori (1) _____
- ○ European/Pākehā: (2) _____
- ○ Pacific Peoples: (3) _____

○ Asian: (4) _____

○ Middle Eastern/Latin American/African: (5)

_____

○ Other: (6) _____

D7a In which island of New Zealand/Aotearoa do you live?

○ North Island/Te Ika-a-Māui (1)

○ South Island/Te Waipounamu (2)

○ Other (3) _____

D7_NI In what region in New Zealand do you live?

○ Auckland/Tāmaki-makau-rau (1)

○ Waikato (2)

○ Bay of Plenty/Te Moana-a-Toi (3)

○ Gisborne/Te Tai Rāwhiti (4)

○ Hawke's Bay/Te Matau-a-Māui (5)

- ○ Taranaki (6)
- ○ Manawatū-Whanganui (7)
- ○ Wellington/Te Whanga-nui-a-Tara (8)

D7_SI In what region in New Zealand do you live?

- ○ Tasman/Te Tai-o-Aorere (1)
- ○ Nelson/Whakatū (2)
- ○ Marlborough/Te Tauihu-o-te-waka (3)
- ○ West Coast/Te Tai Poutini (4)
- ○ Canterbury/Waitaha (5)
- ○ Otago/Ōtākou (6)
- ○ Southland/Murihiku (7)

Thank you for your time with this survey. Your answers will help inform our understanding of psychological distress in firefighters in New Zealand and what we can do to mitigate this.

If the questions from this survey brought you distress, please seek help from one of the below links or numbers:

Where to get help: **1737** - Free call or text 1737 (24/7) **What's Up** - Call 0800 WHATS UP (0800 942 8787) **Lifeline** - Call 0800 LIFELINE (0800 543 354) (24/7) **Samaritans** - Call 0800 726 666 (24/7 Crisis helpline) **Depression Helpline** - Call 0800 111 757 (24/7) **Suicide Crisis Helpline** - Call 0508 TAUTOKO (0508 828 865) (24/7)
FENZ services: Vitae Services Region 1, 2, 3 - Call 0508 664 981 EAP Services Region 4 and 5 - Call 0800 327 669 or call your Communication Centre who can put you in touch with a Peer Support person or Safety, Health and Wellbeing Advisor in your region. You can do this without giving your name.

Contact details of the researchers:
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Doctor Ian de Terte – Primary supervisor
Email: I.deTerte@Massey.ac.nz

Professor Janet Leathem – Secondary supervisor
Email: J.M.Leathem@Massey.ac.nz

End
Thank you for your responses.

Clicking the **Submit** button below will submit your responses and then transfer you to a separate survey to collect contact details if you wish to participate in a prize draw to win one of ten gift vouchers or request a summary of results.

Appendix E. Letter of Support From UFBA

20 January 2021

To whom it may concern

The United Fire Brigades' Association (UFBA) is very happy to support Jeannette Bertram's Doctoral research study. We believe the subject is important and that the findings will be useful to decision makers in the fire and emergency sector.

The UFBA has agreed to share an invitation to participate with our members through our electronic newsletter and the 'Latest updates' section of our website https://www.ufba.org.nz/news-and-updates/latest-updates

The UFBA understands that a detailed report outlining the findings of this research study will be available to all participants, on request, once the study is complete. The report will also be submitted to the UFBA and Fire and Emergency New Zealand before being published.

Jeannette has explained that the information she gathers through her study, will be used in her Doctoral thesis, and submitted for assessment. The UFBA understands that the findings may be published in scientific journals and presented at scientific conferences in New Zealand and overseas. We are pleased to note that the results will be reported in such a way that participants will not be able to be identified.

Yours sincerely

Bill Butzbach
Chief Executive

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U.F.B.A
UNITED FIRE BRIGADES' ASSOCIATION OF NEW ZEALAND

Appendix F. Case Study

Reflections on Research Process and its Application to Clinical Practice

A case study presented in partial fulfilment of

The degree of

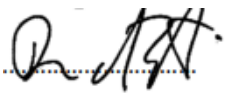
Doctorate of Clinical Psychology

Jeannette Bertram

2022

This case study represents the work of Jeannette Bertram during her research from 2020 to 2021 and reflections as a Clinical Psychology Intern in 2022. The research component was supervised by Dr. Ian de Terte and Prof. Janet Leathem. Special thanks go to the participants in the study, firefighters in New Zealand, for their contribution to the research. Practical experience was obtained during my internship at Infant, Child, Adolescent and Family Services in Lower Hutt and Wellington South Community Mental Health Team in 2022, as well as prior placements at the Massey University Psychology Clinic and Department of Corrections. Any client information included in the case study has been altered to protect their anonymity.

Candidate: Jeannette Bertram……  …… Date:…16/11/2022

Supervisor: Dr. Ian de Terte  Date:…17/11/2022

Abstract

As part of the journey to become a clinical psychologist, candidates conduct research as well as internship placements. This case study is part of the research project and describes the process, the results of the thesis, and the implications of the generated knowledge on my clinical practice. The purpose of the thesis was to explore the levels of psychological distress in a sample of New Zealand (NZ) firefighters. For the thesis, data was collected from 220 NZ firefighters through an online survey; results showed that 99% of the sample reported exposure to four or more Potentially Traumatic Event (PTE) types and experienced double the trauma exposure than the general population. Further, post-traumatic stress symptoms (PTSS), depression, and suicidal ideation (SI) rates were significantly higher than the general population. Third, better self-regulation skills were associated with less psychological distress. The knowledge of those results impacted my work as a colleague in the team as I considered the potential distress they may have been experiencing in their professional work, as well as in my own practice by ensuring I practiced self-care and used my self-regulation skills.

Ehara taku toa i te toa takitahi, he toa takitini

My strength is not as an individual, but as a collective

Psychological Distress in New Zealand Firefighters

An important part of being a clinical psychologist is being able to combine research and practice (Dorsey & Harper, 2018). This entails working from a scientist-practitioner model, which means that professional psychologists should be able to read, evaluate and apply the best available scientific research to their clinical work, while also conducting research to contribute practice-based knowledge in order to enhance the existing knowledge base (Dorsey & Harper, 2018). One such way of contributing to the knowledge base is through the attached doctoral thesis, which examined the levels of psychological distress of a sample of New Zealand (NZ) firefighters, as well as the impact of cumulative trauma and self-regulation skills on this psychological distress. This case study will outline my reflections on the research process and how this has impacted my clinical work during my internship.

ICAFS

The practical experience during my internship was gained as a Clinical Psychology Intern at the Infant, Child, Adolescent and Family Services (ICAFS). ICAFS works from a Choice and Partnership Approach (CAPA), which is a collaborative service improvement model offering choices to young people and their whānau as well as partnership with clinicians during treatment (Whāraurau, n.d.). The first appointment of the young person, their family and the clinician is called the Choice appointment, and aims to explore the family and young person's areas of concerns, any risk issues and possible diagnosis, finishing with a discussion of alternatives to present a choice to the young person and their family. Within ICAFS, the Tautāwhi team is responsible for the Choice

appointments and potential brief interventions, while the Kaiārahi team takes on longer treatment under Partnership. When the family and the Choice clinician collaboratively decide that the ICAFS service is the right fit, the client will be matched with a Partnership clinician that appears a good fit in terms of knowledge, skills, and if possible, personal style.

Clinicians: First Responders of Mental Health

Part of working for a DHB, as a secondary service, means that clinicians work with moderate to severe mental health difficulties. While some clients' difficulties and treatment may be relatively straight forward, in most cases, it involves complex presentations. An important part of the work of the Tautāwhi team is assessment of clients that present in a severely distressed manner, both to the service itself as well as being seen at the emergency department after a suicide attempt. In my thesis, first responders were defined as a diverse group of professionals who are asked to help in emergencies, where their tasks entail protection of people's lives, safety, or property (Arble & Arnetz, 2017). Furthermore, first responders receive focused training, to aid them in their decisions to ensure the health and safety of the individuals. Therefore, it could be argued that the clinicians are the first responders for mental health emergencies (Kleim & Westphal, 2011; Molnar et al., 2017). In this sense, research has shown that first responders have a myriad of concerns to manage while responding to emergencies, such as high work pressure, ensuring safety of victims and bystanders all while being exposed to PTEs ((Klimley et al., 2018).

Doctoral Research Overview

As discussed in my thesis, the research developed from personal experience firefighting in NZ. My years in the ranks of recruit, firefighter, and qualified firefighter, combined with my role as a peer supporter led to an acute awareness of the stressors involved. Conversations with fellow firefighters shed a light on their concerns and frustrations, with some expressing concerns regarding the training firefighters receive. During training, there is a heavy focus on how to respond effectively to fire and rescue calls, but a limited focus on caring for the psychological wellbeing of the firefighters themselves. While the importance of first responders' mental health has been increasingly recognized globally, firefighters in NZ have not yet been well researched.

My research thesis aimed to build on the existing international knowledge base and expand by examining the presence of PTSS, depression, and SI in a sample of NZ firefighters. Further, I investigated the impact of PTEs and self-regulation skills on the psychological distress of NZ firefighters. According to the DSM-5, PTEs include events of actual or threatened death, serious injury or sexual violence (APA, 2013). Globally, 91.5% of firefighters have been or will be exposed to trauma, with some firefighters reporting attendance to 17 different types of PTEs during their career, two of which occurred within the past year (Meyer et al., 2012). One third of firefighters report a lifetime exposure to three or more traumatic events, within or outside of fire service. In 2014, Fire and Emergency New Zealand (FENZ) entered into an understanding with New Zealand's ambulance services (St Johns and Wellington Free), that firefighters would attend medical calls that are classified as "purple." Purple calls include

immediately life-threatening events, such as cardiac arrest, suicide attempts and choking. This 2014 understanding has led to an increase in exposure for NZ firefighters to fatal and potentially traumatic calls, including suicide attempts and paediatric cardiac arrests (Adams et al., 2018).

Research has shown that international incidence rates of PTSS in the general population range from 6.8% to 7.8% (Kessler et al., 2005; Mendes et al., 2008), while the rates for firefighters internationally range from 8% to 22.2% (Corneil et al., 1999; Del Ben et al., 2006). For depression, the international incidence rate for the general population was found to be 6.6% (Kessler et al., 2003), and for New Zealand, 5.7% (Oakley-Browne et al., 2006). The incidence rate for depression in firefighters internationally was 20% (Regehr et al., 2000). Globally, nearly 800,000 people die by suicide annually, and it is estimated that 20 times more people attempt suicide (World Health Organization, 2019).

Impact of PTEs

Higher exposure to PTEs has been shown to be linked to higher levels of SI (H. Park et al., 2019). Stressful life events, such as PTEs, have been found to be particularly damaging to individuals' wellbeing when self-regulation skills and coping abilities are low (Baumann et al., 2005). Differences in self-regulation skills can influence levels of rumination, which plays an important role in the development of PTSS, depression, as well as increases the risk of SI (Brewin & Holmes, 2003; Dhingra et al., 2016; Vohs & Baumeister, 2004). Lower self-regulation skills have been linked with increased attempted suicidal behaviours (Malouf et al., 2014). Self-regulation skills have also been

found to be an important determinant in the recovery from PTEs (Benight & Bandura, 2004b; A. J. Smith et al., 2015).

Impact of PTSS

Exploring the impact of PTEs on the development of PTSS is important, as internationally, scientific evidence has found that firefighters with PTSS symptoms were four times more likely to exhibit suicidal ideation and had 5.2% higher odds of suicide attempts (Jakupcak et al., 2009). This risk increases when individuals experience a comorbid disorder, such as major depressive disorder, which is why these concepts are important to study. Despite a large amount of international research, there was no specific literature on the existence of PTSS, depression, and SI in firefighters in NZ. Therefore, the research aims were three-fold: first, to investigate psychological distress in NZ firefighters; second, to investigate the relationship between PTEs and psychological distress in NZ firefighters; and third, to investigate whether self-regulation skills are associated with less psychological distress in NZ firefighters and weakens the relationship between PTEs and psychological distress.

This research started with a scoping review of the existing evidence of the precursors to SI in firefighters. The results of this scoping review were used to help select measures to include in the online survey. The survey comprised of five sections: occupational characteristics, trauma exposure, psychological distress, self-regulation skills, and demographics. All scales used were self-report measures. The occupational characteristics and demographics sections included questions to assess firefighter experiences, such as years served as a firefighter and rank as well as age and education.

To assess the cumulative trauma exposure, the Life Events Checklist for DSM-5 (LEC-5; Weathers, Blake, et al., 2013) was used, which screens for 16 events known to potentially traumatize people, such as *fire or explosion*, and gives participants options to indicate whether the event happened to them, they witnessed it or were exposed to it as part of their job. Psychological distress was measured through the PTSD Checklist for DSM-5 (PCL-5; Weathers, Litz, et al., 2013) to assess PTSS levels, the Patient Health Questionnaire (PHQ-9; Kroenke et al., 2001) to measure depression levels and the Self-Injurious Thoughts and Behaviours Interview-Short Form (SITBI-SF; Nock et al., 2007) to assess suicidal thoughts, suicide plans, suicide attempts and NSSI. Lastly, self-regulation skills were assessed with the Brief Self-Control Scale (BSCS; Tangney et al., 2004). Overall, the survey comprised of 81 items and took approximately 20 minutes to complete.

The questionnaire was distributed to New Zealand firefighters through an online survey. Data was collected from 220 New Zealand firefighters and analysed using multiple regression analyses. Results showed that 99% of the sample reported exposure to four or more PTE types. While there are no numbers available for PTE exposure of the New Zealand general population, Creamer, Burgess, and MacFarlane (2001) reported an estimated 50.0-65.0% incidence of PTE exposure in the Australian general population. The study results show that NZ firefighters have double the incidence of PTE exposure than the Australian general population. Further, PTSS, depression, and SI rates were significantly higher than the general population. While NZ's general population incidence for PTSS was estimated to be 3% (Wells, 2006), the sample of NZ firefighters showed a presence of 21.4%. For depression, firefighters experienced an

incidence rate of 14% compared to the general population rate of 5.7% (Oakley-Browne et al., 2006). Suicidal ideation was reported by 32.3% of firefighters, 10.5% had made suicide plans and 4.5% had made one or more attempt. The results further showed that career firefighters experienced significantly higher trauma exposure than volunteer firefighters, but there were no significant differences in the levels of psychological distress between the two groups. Overall, as cumulative trauma exposure increased, so did the level of psychological distress experienced. Bivariate correlations further showed significant positive correlations between psychological distress and demographic and occupational characteristics, such as cumulative trauma exposure was correlated with suicide plans. Lastly, a moderation analysis using a hierarchical multiple regression found that better self-regulation skills were associated with less psychological distress and moderated the relationship between cumulative trauma exposure and psychological distress.

Impact of my Research on my Clinical Practice

The thesis results revealed that as cumulative trauma exposure increased, so did the level of psychological distress experienced. The knowledge of those results impacted my work as a colleague in the Tautāwhi team in that I considered the potential distress my colleagues may have been experiencing in their professional work. Discussion with my colleagues revealed multiple incidences that occurred during their career that were not necessarily incidents they had been prepared for. The knowledge of the results of my research, such as the finding that the sample of NZ firefighters as first responders revealed a significantly higher presence of PTSS, depression and SI than the general

population, impacted my reflections as I worked alongside my colleagues. My research has applied in my clinical work by giving me a theoretical foundation. In fact, as described above, one in five participants of my research sample experienced some sort of distress, and I was cognisant of this knowledge while I had discussions with my colleagues regarding their daily work, or after particularly distressing sessions that some may have experienced.

Working within the team at ICAFS, I felt that the team culture was built to find moments where colleagues could share with each other as well as moments where the team could come together and take their mind off the often-difficult work. The days at ICAFS are started by saying a karakia, followed by the singing of a few waiata. This is a way of opening the day in a positive manner, and coming together as a team, before going into Multi-Disciplinary Teams (MDTs) meetings to discuss urgent issues that have come up for clients. Another moment is at the end of those meetings is participating in the online Stuff quiz as a team, in a non-psychology-related bonding exercise intended to have a moment to reset one's mind before returning to work. Further, each clinician is placed in a peer supervision group, and each group has times where they can meet up and discuss whatever they feel they need to discuss in those moments; this may be a treatment they are feeling stuck with or personal issues. Apart from these groups, there are also smaller groups that are organically formed within the wider team, where clinicians go for a walk throughout the day, have a coffee with others, etc.

Lastly, the culture of shared kai, although at the moment more difficult in a COVID environment, is also an important part of the ICAFS culture. Clinicians leaving,

permanently or on maternity leave, are celebrated by a lunch where members of the team bring a dish. The ones going on maternity leave are given a basket full of presents, both handmade or personalized by their colleagues, and they are subjected to a PowerPoint with embarrassing photos or information tidbits and the team take part in a quiz about baby knowledge. Every birthday of a member of the team is also celebrated with singing and a cake brought by a colleague.

Discussions with my colleagues revealed that each clinician was affected by traumas they experienced in different ways. There were those who had background in other first responders' type of work, who felt that their career had readied them for dealing with difficult situations at ICAFS, such as assessing a distressed and suicidal individual presenting in the emergency department. After dealing with distressed individuals or distressing scenes, assessing people in the aftermath of these incidents was not as distressing for these clinicians as it was for those who had more recently graduated from university and were in their first few years of their career.

Just as each clinician was affected in different ways, they also had individually different coping mechanisms and styles. It was clear these different mechanisms and styles were also influenced by their background and theoretical knowledge. For example, while some colleagues tended to cope with harder days and difficult discussions in MDT meetings by enjoying the participation in the quiz at the end, others expressed their concern that doing so took away an opportunity to discuss within the team how certain clients or a discussion about the client's distress might bring up feelings within clinicians. These clinicians would prefer that, rather than move on

immediately to a quiz with light-hearted banter, they have the opportunity to discuss their own feelings before heading back to their desks. Other clinicians were happy to have the opportunity to engage in a quiz as a team as a way of closing off difficult discussions or disagreements before going back to their individual work.

The complex types of presentations and clients can take up a lot of clinician's headspace. There are clinicians who compensate for these difficulties by working part time at the DHB, and part time as private practitioners, either in their own practice or for other primary sector clinics. The clients who seek the services of private practitioners often present with a lower level of complexity and may be more motivated for change as well.

Application of Skills in Report Writing

Another important reflection upon the skills I gained from my research is that part of conducting a doctoral piece of research involves gathering a large amount of information to summarize in a literature review, as well as gathering data and being able to analyse it and write up a conclusion that can be drawn based of the data. The first part of my thesis was a scoping review of the research that was done in the field of precursors to suicidal ideation in firefighters. During my internship, I was able to apply those learnt skills when writing up a report about a Choice appointment. A Choice appointment includes the gathering of information from the client and their family, as well as sometimes from school, other secondary sources, and the client's electronic file. This information is then presented in the clinical report in the current situation, presenting difficulties, developmental and educational background parts of the report.

After gathering and writing up the data, I would then use my analysis and research skills to be able to draw on psychological theory and knowledge to write up the formulation, combining the presenting difficulties with results of psychometric assessments, psychological models of diagnoses, while remaining aware of my own personal background, values, and biases. Lastly, the information and formulation would then be used to inform a treatment plan and recommendations.

Second, during my research, I conducted a pilot study to see what worked in my survey and what did not work as it was meant to. This involved asking for feedback from participants, reflecting on how to improve before the data collection, as well as being able to reflect on results after data collection, before writing up how future research may improve the process. I applied this process in my practice as a clinician by asking clients for feedback after sessions, as well as reflecting myself what seemed to work for a client and what not, while considering how to improve for the next session or next client with a similar presentation. I was able to use these skills for my Choice appointments, reflecting on them by myself as well as in supervision or during class screenings. During interventions, I was able to use these skills by listening to my supervisor's feedback, as well as adjusting my working style to a particular client.

Further Reflections

Reflecting on the results of my research during my work as a clinician has often led me to consider how I handle the more complex or distressed clients. For example, during my research I found studies describing how attending suicide calls increased a firefighter's risk of suicidality (Stanley et al., 2015). This knowledge made me wonder

about the impact of suicidal clients on clinicians, and when coming out of a session with a suicidal client, I took extra care at times to discuss these reflections in supervision, and to spend time in self-care in the days afterwards.

Another way I have worked on my self-care is my ability to leave work at work. The further along I get on my journey as a clinician, the more I have worked on my ability to switch off in the weekends. The first difficult sessions at the Massey clinic with a suicidal client stayed with me going home and through the weekend. While of course I still think about clients at times, I am much more able to process my day during my drive home and then switch off for the evening and be present at home with my family. This processing is aided by using supervision and MDT to develop a shared understanding and share the burden.

Work as First Responder Impact on Work as Clinician. Furthermore, my work as a firefighter is, in possibly a weird way, a form of self-care. While limited during the year of my internship, occasionally I did respond to emergencies in my capacity as a Qualified Fire Fighter or as peer supporter for other firefighters. Spending a moment in a fire truck rushing down the road with lights and sirens is one of the best ways to really be present in the moment. Even if the call is an impactful one, like an attempted suicide or a CPR where we are unable to revive a person (as was the case this morning as I am finishing up writing this case study), it appears to help put the rest of life in perspective. It makes one appreciate what you have, and to be able to enjoy the other moments in life. As hard as the internship year can be, with the commute and children and all the

learning, it also means we are at the start of our career, and calls like these can remind me of the privilege I am experiencing being in this program.

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