

Occupational Related Consequences for Relatives of Firefighters

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fulfilment of the requirements of
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Contents

TABLE OF FIGURES AND TABLES	6
ABSTRACT	8
CHAPTER ONE: INTRODUCTION TO THESIS.....	9
1.1 OVERVIEW	9
1.2 AIMS AND OBJECTIVES.....	9
1.3 <i>Research Questions</i>	10
1.4 ORIGINAL CONTRIBUTION OF THE THESIS.....	10
1.5 SYNOPSIS OF THESIS	11
1.5 CONCLUSION TO CHAPTER.....	12
CHAPTER TWO: REVIEW OF CONTEXTUAL LITERATURE	13
2.1. INTRODUCTION TO CHAPTER	13
2.2 THE FIRE AND RESCUE SERVICE AS A CONTEXT.....	13
2.3 <i>The Fire and Rescue Service Structure</i>	13
2.4 <i>The Fire and Rescue Service Culture</i>	19
2.5 <i>The Organisation and Cultural Context</i>	19
2.6 CONCLUSION TO CHAPTER.....	19
CHAPTER THREE: THEORETICAL FRAMEWORK OF THE RESEARCH PROGRAMME	21
3.1. INTRODUCTION TO CHAPTER	21
3.2 WORK-FAMILY INTERFACE.....	21
3.3 <i>Impact of Critical Occupations on Family</i>	24
3.4 <i>The Work-Home Interface and Patterns of Working</i>	25
3.5 Conclusion of Work-Family Interface Literature	26
3.6 THEORETICAL CONSIDERATION OF A 'FAMILY'	26
3.7 <i>Family processes</i>	27
3.8 <i>Fictitious families</i>	28
3.9 <i>Stress upon the Family</i>	28
3.9 Conclusion of Theoretical Consequences of the Family Literature	30
3.10 TRAUMATIC REACTIONS	30
3.11 <i>Traumatic and emotional reactions of firefighters</i>	30
3.12 <i>Professional trauma</i>	32
3.13 <i>Social support for firefighters from peers</i>	32
3.14 <i>Traumatic reactions and family members</i>	34
3.15 Vicarious Trauma	37
3.16 Emotional Contagion	39
3.17 Secondary Trauma	41
3.18 Conclusion of Traumatic Reactions and family members	42
3.19 <i>Research with families of military personnel</i>	42
3.20 Conclusion of Theoretical Consideration of Traumatic Reactions within the Firefighting Context.....	47
3.21 RISK PERCEPTION.....	47
3.22 <i>Coping with risk</i>	51
3.23 <i>Perception of Occupational Risk/Safety</i>	55
3.24 Conclusion of Theoretical Consideration of Risk Perception	57
3.25 RESILIENCE	58
3.26 WELL-BEING	59
3.27 CONSERVATION OF RESOURCE THEORY	61
3.28 CONCLUSION TO CHAPTER.....	66
CHAPTER FOUR: METHODOLOGY	67
4.1 PHILOSOPHICAL UNDERPINNINGS OF THE THESIS	67
4.2 OVERARCHING METHODOLOGY: MIXED METHODS APPROACH	67
4.3 SEQUENTIAL EXPLORATORY DESIGN.....	67
4.4 QUALITATIVE RESEARCH METHOD: GROUNDED THEORY	68

4.5 <i>Qualitative Data Collection</i>	72
4.6 QUANTITATIVE RESEARCH METHODS: REGRESSION AND PATH ANALYSIS	72
4.7 <i>Quantitative Data Collection</i>	73
Process Used to Select Measurement Scales	74
Structure of Data Collection	75
4.8 <i>Sampling Considerations</i>	75
4.9 CONCLUSION TO CHAPTER	76
CHAPTER FIVE: EMPIRICAL QUALITATIVE STUDY ONE	77
5.1 INTRODUCTION TO CHAPTER: EXPLORATORY SCOPING OF THE PHENOMENA AND DEVELOPING THEORY	77
5.2 METHOD	77
5.3 <i>Design</i>	77
5.4 <i>Sample</i>	77
5.5 <i>Procedure</i>	79
5.6 <i>Ethical Considerations</i>	79
5.7 ANALYSIS	80
5.8 <i>Shared Sacrifices</i>	82
5.9 <i>Sacrifices</i>	82
5.10 <i>Managing sacrifices</i>	84
5.11 <i>Perceptions of Risk</i>	85
5.12 <i>Living with Traumatic Reactions</i>	86
5.13 <i>The FRS Family (Support)</i>	88
5.14 DISCUSSION OF FINDINGS OF CHAPTER	90
5.15 <i>Future theory development and limitations</i>	94
5.16. CONCLUSION TO CHAPTER	95
CHAPTER SIX: PSYCHOMETRIC METHOD FOR STUDIES TWO AND THREE	96
6.1 OVERVIEW: MOVING FROM CONCEPTUAL THEORY TO OPERATIONAL MODEL	96
6.2 MAPPING CONCEPT TO OPERATIONAL VARIABLE: THE PROCESS	96
6.3 OUTCOMES OF SCALE SELECTION	97
6.4 <i>Measures of Risk</i>	98
6.5 <i>Measures of Shared Sacrifices</i>	100
6.6 <i>Measures of the FRS Family</i>	106
6.7 <i>Measures of Living with Traumatic Reactions</i>	107
Discounting the Conservation of Resource Evaluation Scale	109
6.8. PILOT STUDY OF QUESTIONNAIRE PACK CONSTRUCTION	109
6.9 <i>Introduction to Pilot Study</i>	109
6.10 <i>Method</i>	110
6.11 <i>Sampling Strategy</i>	110
6.12 <i>Consideration of relatives</i>	110
6.13 <i>Consideration of country</i>	111
6.14 <i>Participants</i>	111
6.15 <i>Procedure</i>	111
6.16 <i>Feedback</i>	111
6.17 CONCLUSION TO CHAPTER	115
CHAPTER SEVEN: STUDY TWO; PREDICTORS OF RESILIENCE WITHIN FAMILY MEMBERS	116
7.1 INTRODUCTION TO CHAPTER	116
7.2 METHOD	117
7.3 <i>Recruitment of Participants</i>	117
7.4 <i>Participants</i>	118
7.5 ANALYSIS OF DATA	119
7.6 <i>Data Cleaning Process</i>	119
7.7 <i>Deleting Cases</i>	119
7.8 <i>Alterations to Variables</i>	119
7.9 <i>Missing Value Analysis</i>	119
7.10 <i>Normality</i>	121
7.11 <i>Descriptive Analysis of Data</i>	121

7.12 Assessing the sample through descriptive statistics	121
7.13 <i>Evaluation of Reliability of Scales and Subscales</i>	125
7.14 <i>Correlations</i>	126
7.15 <i>Multivariate Analysis of Variance</i>	127
7.16 MANOVA addressing differences in working patterns.....	127
7.17 MANOVA addressing familiarity with firefighter’s role.....	128
7.18 <i>Regression Analysis</i>	129
7.19 DISCUSSION OF FINDINGS OF CHAPTER	131
7.20 CONCLUSION TO CHAPTER	137
CHAPTER EIGHT: STUDY THREE, MODELS OF WELL-BEING	138
8.1 INTRODUCTION TO CHAPTER	138
8.2 METHOD.....	140
8.3 <i>Recruitment of Participants</i>	141
8.4 <i>Participants</i>	141
8.5 DATA ANALYSIS OF STUDY THREE.....	142
8.6 Deleting Cases	142
8.7 Alterations to Variables	143
8.8 Missing Values	143
8.9 Outliers	144
8.10 Measures Exploring Normality.....	144
8.11 <i>Descriptive Analysis to Explore Scores of Study Three</i>	147
8.12 Scores.....	147
8.13 <i>Reliability Evaluations of Scales and Subscales for Study Three</i>	151
8.14 <i>Factor Analysis of the scale ‘Sacrifices Scale’</i>	152
8.15 <i>Correlations</i>	155
8.16 <i>Multivariate Analysis of Variance</i>	159
8.17 <i>Typology of Secondary Trauma</i>	162
8.18 <i>Multivariate Modelling of Study Three: Path Analysis</i>	165
8.19 DISCUSSION	168
8.20 CONCLUSION TO CHAPTER	174
CHAPTER NINE: GENERAL DISCUSSION AND INTEGRATION OF FINDINGS	175
9.1 SUMMARY OF THE THESIS AIMS AND FINDINGS.....	175
9.2 <i>Establishing the Occupational Impact of Firefighting on Relatives</i>	176
9.3 <i>The Intrapersonal Macro Model of Resilience</i>	177
9.4 <i>The Interpersonal Meso Model of Well-being</i>	178
9.5 IMPLICATIONS FOR THEORY.....	179
9.6 IMPLICATIONS FOR PRACTICE	180
9.7 FUTURE DIRECTIONS FOR RESEARCH.....	181
9.8 LIMITATIONS.....	182
9.9 OVERALL STRENGTHS OF THESIS	184
9.10 CONTRIBUTION OF THESIS TO THE RESEARCH AREA	185
9.11 CONCLUSION.....	186
REFERENCES	187
APPENDICES	220
APPENDIX 1.....	220
<i>Study One Interview Schedule</i>	220
APPENDIX 2.....	222
<i>Study Two Questionnaire</i>	222
APPENDIX 3.....	222
<i>Study Three Questionnaire</i>	222
APPENDIX 4.....	222
<i>Conference Publications from this work:</i>	222

Table of Figures and Tables

Figure 1.4.1: Pictorial Representation of Outline and Structure of Thesis.....	12
Figure 2.3.1 Schematic of the Fire and Rescue Service Structure.....	15
Table 2.3.1 Detailing the Taxonomy of Incident Work Involving the FRS	18
Table 3.7.1 of Typology of Families (Moos and Moos, 1978).....	27
Table 3.27.1: The Five Types of Resources	62
Table 3.27.2: Table Denoting Resource Literature Cluster by Type	64
Table 3.27.3: Table Denoting Resource Literature Cluster by Tier	65
Table 5.4.1 Participant Information for Study One.....	78
Table 5.5.1 Key to Transcription Method (taken from Potter, 1996).....	79
Figure 5.7.1 Model of Occupational Impacts for Relatives of Firefighters	81
Table 6.2.1 Study One Variables Mapped to Measurement Scales.....	97
Table 6.11.1 Purposive Sampling and Demographic Variables of Study One and Two	110
Table 6.16.1 Comments from Pilot Study Participants	112
Figure 7.1.1 Venn Diagram of the COR Theory Tiers within this Thesis.....	116
Table 7.1.2 Typology of Variables Associated with Resilience in Study Two.....	117
Table 7.4.1: Relationship Status	118
Table 7.4.2: Firefighter's Working Status for Study Two	118
Table 7.9.1: Analysis of Missing Values for Variables in Study 2.	120
Table 7.12.1 Scale Means for Variables in Study Two	121
Table 7.12.2: Means and Standard Deviations for the Adult Resilience Scale	122
Table 7.12.3: Means and Standard Deviations of the FAD General Functioning Subscale	123
Table 7.12.4: Means and Standard Deviations for Emotional Contagion Subscales	124
Table 7.12.5: Cronbach Alpha Coefficients for the Subscales of the Emotional Contagion Scale	125
Table 7.12.6 Cronbach Alphas for the Current Study and Published Literature for the Resilience Scale	126
Table 7.15.1 Table Comparing MANOVA Box's Outputs for Study Two.....	127
Table 7.17.1 Mean Scores Between Groups Dependent on Number of Years Lived with Firefighter	129
Figure 7.18.1 Path Diagram of Resilience Model	130
Table 7.18.2 Regression Coefficients for Study Two Dependent Variable: Resilience	131
Table 8.1.1: Resources Included in the Modelling of Meso Structures in Study Three	140
Table 8.4.1 Marital Status of Participants in Study Three.....	141
Table 8.4.2 Table Depicting the Country Participants Reside In	142
Table 8.4.3 Table of Firefighters' Working Status for Study Three.....	142
Table 8.8.1 Missing Value Analysis	144
Table 8.10.1 Normality Measures	146
Table 8.11.1.Means and Standard Deviations of Scales for Study Three	147
Table 8.12.1 Percentage Endorsing Each Item of the Trust in Operational Safety Scale	148
Table 8.12.2 Means and Standard Deviations of the FAD General Functioning Subscale for the FRS Family.....	150
Table 8.12.3 Frequency Counts for Responses to Single Item Risk Measure	150
Table 8.14.1 Principal Component Analysis Output	152
Table 8.14.2 PCA Pattern Matrix for 'Sacrifices Scale' within Study Three.....	154
Table 8.14.3 Structure Matrix Output for 'Sacrifices Scale' within Study Three	154
Table 8.15.1 Correlations of all Variables in Study Three	155
Table 8.16.1 Estimated Marginal Means by Country Type.....	161
Table 8.16.1 MANOVAs Addressing Exposure to Organisational Culture	162
Table 8.17.1 Content Analysis for Open Text Response.....	163
Figure 8.18.1 Path Analysis of Study Three	166
Table 8.18.2 Final fitted AMOS model of Occupational Consequences for Relatives of Firefighters (n=120).....	168

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Abstract

Firefighters are exposed to a high prevalence of both occupational and traumatic stress, consequently protective factors, such as social support, become highly relevant to the well-being of this population. Accordingly the psychological health of firefighters is maintained, in part, by their family (Regehr, Dimitropoulos, Bright, George, and Henderson, 2005; Beaton, Murphy, Johnson, Pike, and Corneil, 1999). This thesis aimed to inform the published literature by establishing a detailed model of occupational impacts of the firefighting occupation on relatives of firefighters and the resources they use to manage those impacts. This was undertaken using a sequential mixed methods approach through three empirical studies. Findings across the thesis include the development of the firefighter becoming a 'satellite' family member in order to protect against unusual working patterns, secondary traumatic reactions and relatives' perception of danger and harm within the occupation. In addition to this, findings clearly highlight the need for firefighters to share their expertise and job content with their families; facilitating the relatives' ability to protect their personal resilience and well-being and their firefighter. However if firefighters become disengaged, rather than a 'satellite' family member, then their reactions to their job content becomes decontextualised for their relatives. This in turn causes the well-being of relatives to decrease and an increase in secondary trauma of the relative related to their firefighter's experiences. A prevalence rate of 12% was established for this population of secondary trauma for relatives of firefighters by this thesis. To establish the homogeneity of this population differences were explored based upon rank, length of service of the firefighters, and continent of service, all of which suggest the group is homogenous. Differences of length of time the relative has lived with the firefighter were significant providing further support to the finding that educating relatives about the role of the firefighter is an enabling and protective factor. Implications for theory are discussed, concluding with evidenced-based recommendations to effectively support both firefighters and their families. Practical methods are outlined to develop a positive resource ecology within the fire and rescue service community in order to build collective resilience and protect well-being amongst its membership.

Chapter One: Introduction to Thesis

1.1 Overview

Emergency service workers are documented within the literature as having a high prevalence of both occupational stress (Mitani, Fujita, Nakata, and Shirakawa, 2006) and traumatic stress (Del Ben, Scotti, Chen, and Fortson, 2006). Within that literature, the inoculating and intervening factor to address this high level of psychological distress is social support (Greenberg, Brooks and Dunn, 2015; Prati and Pietrantonio, 2010a; Prati and Pietrantonio, 2010b; Bernier, 1998; Kaniasty, Norris, and Murrell, 1990). Within the social support literature, co-worker network and spousal/family support are identified as the two sources of support for emergency workers (Beaton, Murphy, Johnson, Pike, and Corneil, 1999; Nixon, Schorr, Boudreaux, and Vincent, 1999).

Despite being one of the primary sources of support to firefighters, little attention has been paid to the impact of this role on the family members themselves. This is critical since apathy by family members will affect not just the family member, or the firefighter (from a reduction in the resources available) but also potentially the family unit itself. The literature offers very little academic, empirical work in this area (Regehr, Dimitropoulos, Bright, George, and Henderson, 2005). With respect to other emergency services, there is some literature exploring this issue (see Crank and Caldero, 1991; He, Zhao and Archbold, 2002; Beehr, Johnson and Nieva 1995; Toch, 2002; Youngcourt and Huffman, 2005); however, it is exclusively relating to police officers. Although this offers some guidance for policy makers and managers, the emergency services operate and function in different ways (Prati and Pietrantonio, 2010a; Regehr, Hill, Goldberg and Hughes, 2003), leading to distinctive experiences for relatives of personnel. Research exploring the impact on relatives of firefighters would address this need, offering an original contribution to knowledge.

Throughout this thesis, a firefighter will be defined as an operational firefighter who is defined as a member of a fire and rescue service (FRS) who has responsibility for responding to incidents.

Considering the un-chartered element of this research, an exploratory mixed methods approach gave the freedom to identify factors through the experiences of relatives, and the ability to test the interaction of these factors. Grounded Theory (Glaser and Strauss, 1967) was used to generate models of social support and wider resources which were subsequently tested using regression analysis and path analysis.

1.2 Aims and Objectives

This thesis explores the occupation-related consequences for relatives of firefighters. Chiefly, it explores the possible impact of the occupation upon relatives (significant others) of operational firefighters and the resources relatives draw upon to inoculate against the potential impacts.

The thesis will develop a theoretical framework of how threats to well-being and personal resilience are experienced and responded to by families of firefighters. This framework of resources will be tested and refined in light of relevant literature. The findings will allow greater understanding of how to facilitate collective resilience and well-being within this population, and also offer ways for the Fire and Rescue Service to support families effectively. The definition of personal and collective resilience can be seen in Nato Guidance (2008; pages 39-40). In this thesis when resilience is used for relatives or families of firefighters please read 'personal resilience'. When this thesis refers to the wider firefighter community and those outside the family of the firefighter, please read 'collective resilience'.

1.3 Research Questions

These research questions will retain the numbering and phrasing used below throughout this thesis. This technique is used to facilitate the reader's identification of where and how they are addressed through this thesis.

(A) Establishing the occupational impact of firefighting on relatives

(A1) What are these impacts on relatives and what are their effects?

(A2) What is the mechanism by which these occupational impacts affect relatives?

(B) Identifying what resources are used by relatives to respond to these impacts

(B3) What individual and family resources facilitate and maintain the resilience of relatives?

(B4) What socio-cultural resources facilitate and maintain the well-being of relatives?

(B5) How can the Fire and Rescue Service support relatives to effectively respond to occupational impacts of firefighting and support their firefighter?

(C) Identifying international differences in the nature of occupational impacts and the resources used by relatives to respond to these

(C6) How does the experience of firefighters' relatives in Europe compare with the experiences of those in North America?

(D) Establishing the effects of traumatic reactions

(D7) What events do relatives perceive as distressing to firefighters?

(D8) What effect do the traumatic reactions of firefighters have on relatives?

This thesis is structured around three empirical studies, conducted through a programme of research, in order to address the above research questions.

1.4 Original Contribution of the Thesis

The thesis will make an original contribution to research by conceptualising the work-home interface within the context of firefighting. It will also advance the understanding of secondary trauma within relatives of firefighters. Thirdly, the thesis will explore normalising and processing of occupational impacts by relatives of firefighters. Finally, this thesis will provide novel theoretical insights.

1.5 Synopsis of Thesis

Following this introductory chapter, chapter two will review the contextual literature to outline the context of the Fire and Rescue Service; how the service is structured, the typical work undertaken and the organisational culture. This is provided before a comprehensive review of relevant literature (chapter three).

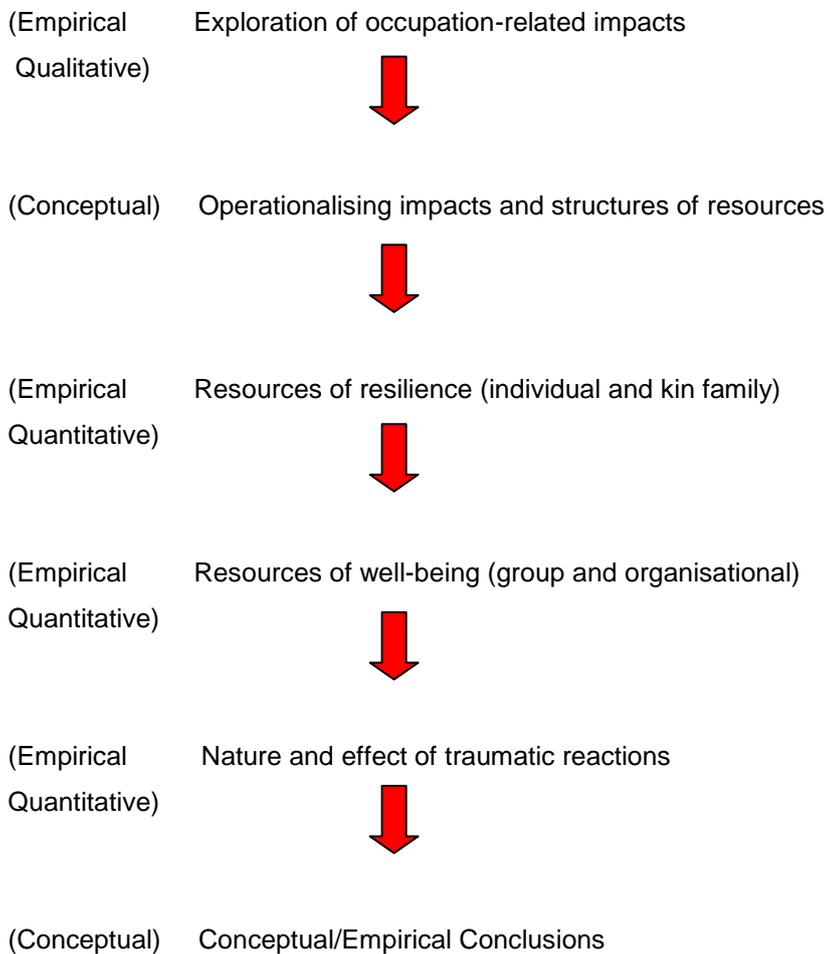
The fourth chapter outlines the methodology used in this thesis. This chapter details the exploratory, sequential design used and the rationale for the overall design. Justifications for both qualitative and quantitative methods will be detailed as well as comprehensive descriptions of the analyses used in this programme of research.

The first empirical study is detailed in chapter five and establishes the nature, mechanism and effect on relatives of occupational impacts of firefighting. Chapter six provides the rigorous process by which impacts and resources were conceptually mapped onto established psychological constructs (detailed in chapter three) and associated measures, to provide empirically testable variables.

In chapter seven, the second empirical study models and tests the structures supporting resilience within relatives. Chapter eight presents the results of a path analysis model of relatives' well-being. This third empirical study explores the group level and organisation specific resources to support relatives' well-being.

The last chapter, chapter nine, summarises the results and discussions of the previous chapters and provides implications for theory and practice, discusses limitations, suggests future directions for research and outlines the unique contribution of this thesis to the research area.

Figure 1.4.1: Pictorial Representation of Outline and Structure of Thesis



1.5 Conclusion to Chapter

This chapter has outlined the need to understand the impacts on the individual relatives of firefighters from the firefighting occupation; providing a rationale for the thesis. This thesis outlined has enabled the examination of this phenomenon. The next chapter will provide a review of the firefighting occupation, organisation, structure and culture in order to contextualise the research programme and future discussions of literature.

Chapter Two: Review of Contextual Literature

2.1. Introduction to Chapter

This chapter will outline the context of the Fire and Rescue Service, how the Fire and Rescue Service is structured, the typical work they undertake within their remit and the organisational culture of the Fire Service both within the UK and typical culture within other English speaking services across the globe. Empirical work in this thesis has been contextualised to the Fire and Rescue Service specifically in order to provide insight to the issues detailed in section 1.2 of the previous chapter.

2.2 The Fire and Rescue Service as a Context

The emergency services perform fundamentally different tasks when attending incidents. The police address issues of scene management, traffic, members of the public, other agencies and record information to perform investigative work (Police Recruitment, <http://www.policecouldyou.co.uk/police-officer/index.html> retrieved 19/07/15). The ambulance service provides extensive and specialised treatment of casualties (About us, <http://www.emas.nhs.uk/about-us/> retrieved 19/07/15). The fire service secures the incident site and extricates casualties from the scene of the incident (Fire and Rescue Recruitment, <http://www.fireservice.co.uk./recruitment> retrieved 19/07/15).

Research has demonstrated that these differences in roles have differing consequences and therefore the emergency services should not be researched as one homogenous group (Perrin, DiGrande, Wheeler, Thorpe, Farfel and Brackbill, 2007). Firefighters, in comparison to other emergency service workers, have increased threats of physical injury and psychological distress (Skogstad, Skorstad, Lie, Conradi, Heir and Weisaeth, 2013; Wagner and O'Neill, 2012), but also are the only group to work within a group structure; the watch (see sections 2.2, 2.3, 2.4, 3.4 for more detail).

2.3 The Fire and Rescue Service Structure

The whole of the UK is divided up into geographical Fire and Rescue Services (FRS); there are approximately 53 FRS (as stated by the Chief Fire Officers' Association website; <http://www.cfoa.org.uk/12072>, retrieved 21/09/14) which typically serve an area designated as a county (although some boundaries differ slightly from this). The average FRS within the UK has in the region of 2000-3000 personnel; this includes both operational (this means they respond to incidents such as fires and road traffic collisions) and support staff (such as control operatives, personnel professionals, training specialists and professional staff). The operational staff can be *whole time* (they are employed full time, there are approximately 38,000 in total in the UK) or retained (they train once a week but only respond when there is an incident; there are approximately 18,500 retained firefighters in the UK).

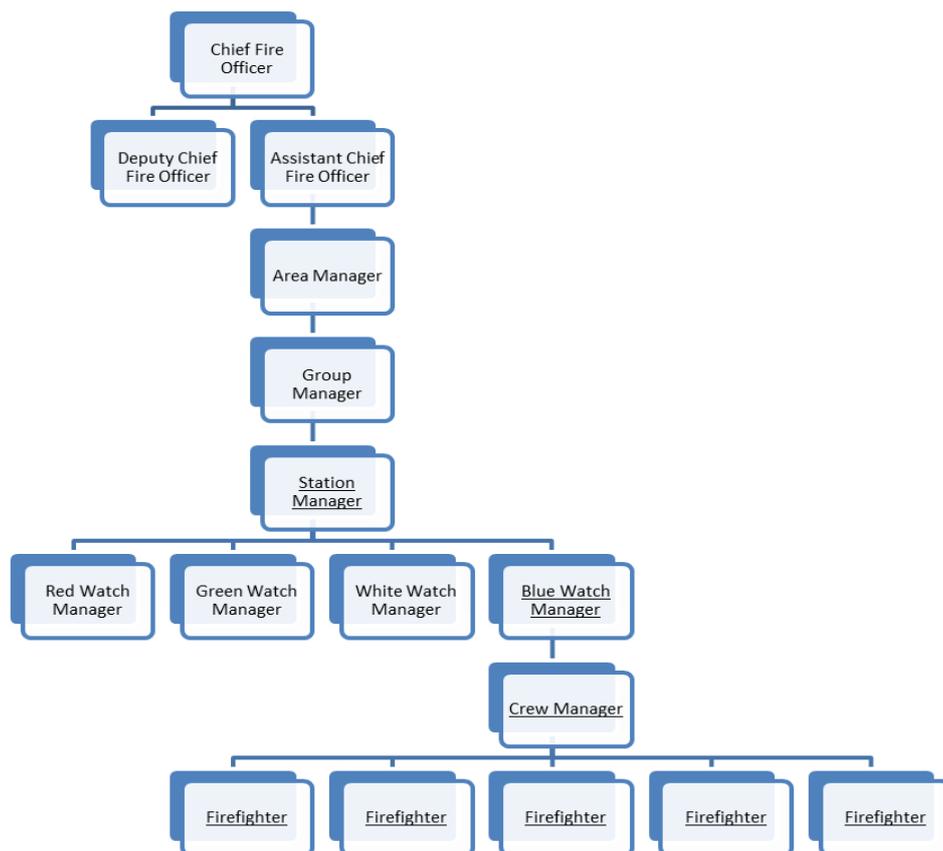
Fire personnel have several different work patterns depending on the role they occupy within the organisation. Most full time and part time operational firefighters are allocated to one of four shifts called 'watches'. There are four watches: Blue, White, Red and Green and this pattern enables cover to be provided at all times throughout the UK. These watches work a shift system, usually between nine and fifteen hours long, falling in a pattern of two days, two nights and three days' rest, repeating the pattern throughout the year. When one shift is resting, another shift provides cover. There are some variations to the shift length and pattern of days and nights between services, but this is a good representation of the average shift system.

Day crewed firefighters are also full time in that they work for forty two hours per week, but only during the day. This could be Monday to Friday, or it could be a seven day crewed station. The flexi-duty system involves a nine to five, five day week at a desk; but for certain twenty-four hour periods in line with a rota system (anytime within the week and weekends) they are also on call for operational duty. Most managers within the FRS are working on the flexi-system to provide management at large incidents.

Both shift systems and on-call working patterns are used by retained firefighters. This means that if they are spending time with their families at that time, they are restricted in their location, activity and method of transport.

The figure below illustrates the structure of the FRS above the watch structure; the professional service staff report to the Deputy Chief Fire Officer. Blue Watch has been used within this figure to illustrate a typical working definition of the watch as defined by connectedness and personal relationships. All roles underlined in the diagram below illustrate the typical watch. Membership of a watch include immediate managers up to the level of station manager.

Figure 2.3.1 Schematic of the Fire and Rescue Service Structure



The watches on each station are traditionally crewed by seven individuals who are assigned to that watch and stay as a team until one transfers, retires, is injured etc. If a crew member leaves for some reason, their position will be filled by another firefighter, be that a transferee or a newly qualified 'probationer'. The published literature examining this phenomenon has identified the tight co-worker network which these watches operate within (Neale, 1991; Bacharach, Bamberger and Doveh, 2008, Regehr, 2009; Schumm, Bell and Resnick, 2001). The literature provides evidence for negative behaviours, such as bullying (Brunsdon, Hill and Maguire, 2012), but predominately provides evidence that the high psychological resilience (Pietrantonio and Prati, 2008) demonstrated by most firefighters is enabled by the peer support and shared coping strategies of this group of individuals (Hill and Brunsdon, 2003; Hill and Brunsdon, 2009; Hawker, Durkin and Hawker, 2011; Pietrantonio and Prati, 2008). Literature from the USA and Canada (Regehr, Dimitropoulos, Bright, George and Henderson, 2005; Kirshman, 2004) suggest that firefighters describe their watch as a second family because of the large amount of time spent and shared experiences they have together; this is reflected in anecdotal and practitioner reflections as well as academic literature.

Each team has a crew manager and a watch manager, with the watch manager carrying overall responsibility. This is in regard to line management, fireground instruction and training. The watch manager is responsible for personnel issues and competency levels of the watch

members, and usually takes the incident command post at an incident. Above that position is a station manager who manages the watch managers, the fire station, equipment and the firefighters assigned to that station on all four watches. These managers are also operational but this differs with the geographical area. For example, in a rural smaller FRS, such as Lincolnshire, there will be a station manager who provides cover to the county in a rotational shift pattern, and they will manage a station.

Stations are clustered in geographical areas and regional managers, called group managers, are responsible for the running and resources of these stations. Above the regional managers are strategic managers called area managers who are responsible for the strategic direction of the FRS. Each service usually has a senior management/leadership team which include the area managers, but also include; an assistant chief fire officer who has operational (fireground) responsibilities, this will include ensuring that the operational watches can respond to. A deputy chief fire officer has support responsibilities (everything that supports the fireground function); this typically includes personnel, finance and estates. Leading the organisation is the chief fire officer who has overall responsibility and control of the organisation along with senior management/leadership who are responsible for the FRS to their Fire Authority who represents the local/county authority/government.

The average day for this level of management would be a nine to five desk based job, similar to most regional and strategic managers in other industries. The activities within an average day for an operational firefighter would be quite different and typically comprises a range of activities. This could include; four hours of community safety (such as completing home safety checks and talks in schools and older people's homes), three hours of developing skill and knowledge (both in the classroom as well as the training ground), at least one hour on equipment testing and maintenance (depending on how many incidents they are called to as equipment is cleaned after each use) and some level of personal fitness, although this is dependent on the individual. Alongside all of this is the expectation that they should respond to all incidents that the control room personnel deploy them to. The control room staff work in shifts exactly the same as the operational fire crews. They also have the same management structure and their work comes under the operational aspect of the organisation. Currently, there are some moves to integrate call centres for 999 emergency calls (Knight, 2013).

When there is an incident, the emergency call takers deploy the nearest fire engine (if one is mobile) or put a call out to a fire station. It is the emergency call staff who make the initial decision regarding the nature of the response, based on the information given by the member of public calling the emergency response. For example, if a member of the public telephones to report a house fire with occupants still inside (termed a 'person's reported') then they will automatically despatch two fire engines (known as 'pumps') to attend that incident. This is because there will be a greater number of people needed; a crew to fight the fire and a crew to

perform search and rescue with breathing apparatus on. The watch on duty then react to this instruction by gaining the location and description of the call provided by the emergency call takers. Typically, only four to six watch members crew a fire engine to an incident at any one time. The extra watch members (if there are any) will staff a rescue tender (a small van with specialist equipment) or an aerial ladder platform which is only used for high rise buildings.

When arriving at the incident, the watch managers (or the station managers depending on the formulation of the watch) assess the situation and decide how to address the incident regarding priorities, strategy, resources etc. This role is the incident commander and usually it is assigned to the most senior fire officer/manager in first attendance at the incident. If the incident becomes more serious or complex, with more crews being sent, the incident commander will brief their superior as they arrive at the incident and the superior will become the incident commander. Usually this is based on the number of crews or engines in attendance. Incidents of more than four engines are quite rare though so the geographical area always has cover at station manager level and there is a rota for group and area managers but they are very rarely required to attend incidents. When there is a large or complex incident typically the Gold, Silver and Bronze Command System is activated which is a tiered system of incident management. Gold is an inter-organisation strategic leadership and decision making team usually comprised of chief fire and police officers, senior civil servants and chief executives of any relevant organisations. This is usually established in a different geographical location to the incident. Silver is an inter-organisation team of strategic leads who establish a location just outside the immediate geographic location of the incident (but within a very short travel distance). They focus on adding relevant information and transferring strategic incident management decisions from gold command in to actionable detailed instructions for the bronze team to action. The bronze teams have a more intra-organisation focus at an operational level, directing teams of people who are immediately dealing with the incident. This established way of working allows a collective response to an incident.

Through this description of organisational activity and structure it is clear that there are discrete roles and responsibilities, where personnel at each level of the organisation are exposed to different factors. This was therefore considered in sampling strategies developed for this thesis. The aim was to capture and explore the range of occupational impacts across these levels. One clear difference between levels of the organisation is the way firefighters work almost exclusively in teams (frequently referred to in the literature as tight co-worker networks), whereas managers tend to complete activities that are more individual. The way in which the firefighters work in these tight co-worker networks will now be considered.

On the fireground, the incident commander is theoretically supposed to delegate tasks to individuals on the watch. However, with the smaller crews, because those individuals work together so frequently they usually know what needs to be done, in what order and by whom

without any orders being given out. The engine driver usually becomes the pump operator and breathing apparatus (BA) board manager (all firefighters in BA have to give equipment and location information to them to record as a safety measure), there are usually two people who put on BA sets, book in at the board and then prepare and take in a 'line' (which is a hose) and another individual will put BA on to do search and rescue. These jobs all depend on at least one other team member in order to complete it safely. If it is a road traffic collision, which is the most common type of incident, the crew tend to use the same team members to make the vehicles safe to prevent further movement, the same person usually gets in the car with the paramedics and the casualty and the others prepare and use cutting equipment. When attending bigger incidents, with lots of fire crews and other emergency personnel and services, coordination is needed and so usually the crew do await instruction before deploying. More detail regarding management of incidents can be found in part 1 of Flin and Arbuthnot (2002). Knowledge of these structures and ways of working will provide framing in order to contextualise empirical findings of this thesis, particularly regarding study one. To summarise the types of incident the FRS typically respond to, the author has developed a taxonomy detailed in table 2.3.1 below:

Table 2.3.1 Detailing the Taxonomy of Incident Work Involving the FRS

Type of event	Role	Stressors associated with event
Road traffic incident	Lead role for extraction of people and health and safety of site	Likelihood of significant injury or death Low risk to firefighter
House fire	Lead role for extraction of people and health and safety of site	Likelihood of significant injury or death Medium to high risk to firefighter
Trapped person (e.g. lift or in machinery)	Lead role for extraction	Medium risk to life and limb Medium risk to firefighter
Nuisance calls	Variable role (depends on call)	Nil risk life and limb Nil risk to firefighter
Flooding	Lead role for extraction and health and safety of site	Minimal risk to life and limb Medium to high risk to firefighter
Animal trapped (e.g. cat up a tree or cow in a river)	Lead role for extraction and health and safety of site	Minimal risk to animal Medium risk to firefighter
Warehouse fire	Lead role for extraction and health and safety of site	Nil risk to life and limb Maximum risk to firefighter

For a full review of types and proportion of work done by the FRS, see Knight (2013).

2.4 The Fire and Rescue Service Culture

The Fire and Rescue Service (FRS) within the UK has been through an organisational and cultural change following the Bain Report (2002) commissioned by the Government and the subsequent industrial action. The origins of the previous and surviving culture stem from a military model. However, following the Bain report, the Fire Service in the UK has now changed some of its working practices and structures. The FRS continues to move away from the military model towards a more organisational style of operating (Bain, 2002; The Fire and Rescue Service, Draft Volume of Written Evidence, 2006; Communication from Walker and Wrack in Circular NJC/09/05, 2005). An example of this is the move from rank to role; traditionally, individuals who held a rank could give orders to reverent subordinates. This aimed to maintain hierarchical structure on the fireground with narrow and accountable communication channels. The change to the role system means individuals occupy roles increasing in complexity and responsibility, awarded through promotion rather than rank. Even though the FRS continues to go through a period of significant change, there are still conventions and practices in the organisation which reflect the organisational structure and history. Knowledge of these unique cultural aspects will provide a framework with which to contextualise this thesis.

2.5 The Organisation and Cultural Context

It is, in part, a result of the organisational structure of the FRS that bonds individuals within the service (Brunsdon, Hill and Maguire, 2012). Until the organisational re-structuring (as a result of the Bain report), all personnel had to enter as a firefighter in order to be promoted up the organisational structure. The only exceptions to this were positions of finance and personnel where specialist professionals have been appointed. Therefore almost all current personnel within the operational FRS have experience of working in very close co-worker teams; getting to know colleagues and their families very well. Subsequently, the literature has identified the proliferation of an FRS family (Kirschman, 2004; Regehr, Dimitropoulos, Bright, George, and Henderson, 2005). This has been identified within the firefighters and their families. The firefighter has a second family, their team on their watch, and an extended family in the relatives of their team. This is reflected from the perspective of the relatives; they know both the team of firefighters and the families of the team. This 'Fire Service Family' is expressed in many different forms, but part of this thesis will seek to establish the typology of this extended family. As most firefighters in the UK have been on a watch, this means that the culture of watches have contributed to the organisational culture of the FRS.

2.6 Conclusion to Chapter

This chapter has reviewed the nature, structure and culture of the firefighting occupation and some connections between these structures have been explored. In chapter one, this thesis identified a gap in the literature: the impact on relatives of the firefighting occupation. That

phenomenon sits within (and is impacted by) the structures identified within this chapter, but this is not an exhaustive list of influential structures which could impact on the relative of firefighters. The resources that an individual has available to them, the family-home interface, family structures, traumatic reactions of their firefighter and their perception of risk to their firefighter in their role will also impact on the individual. With such emphasis on the support from the family safeguarding the well-being of the firefighter, the resilience and well-being of the family is of interest to the Fire and Rescue Service and psychology. The next chapter of this thesis will review the relevant literature in order to explore the possible occupational impacts on relatives.

Chapter Three: Theoretical Framework of the Research Programme

3.1. Introduction to Chapter

In order to further explore the occupational impact of firefighting on relatives, a comprehensive literature review was completed. Literature surrounding work-home interface, working patterns, family functioning, traumatic reactions, perception of risk, safety and physical harm was reviewed. This review will give insight into potential impacts on relatives, whilst being cognisant of the context, culture and group dynamics (Brunsden, Hill and Maguire, 2012) as set out in chapter 2.

3.2 Work-Family Interface

The literature examining the relationship between the domains of work and family has developed substantially over the last thirty years (see Greenhaus, 2008). Exploring the interface between work and family life has traditionally focussed on the impacts on organisations (Ackers, 2003; Behson, 2005; Hammer, Neal, Newsom, Brockwood and Colton, 2005; Karatepe and Badder, 2006; Kossek and Ozeki, 1998; Stevens, Kiger and Riley, 2006) and/or the individual employee (Boyer, Maertz Jr. and Pearson, 2005; Carlson, Kacmar, Wayne and Grzywacz, 2006; Demerouti, Bakker and Schaufeli, 2005; Heller and Watson, 2005; Hughes and Glainsky, 1994). Within these studies, the family of the employee has been typically defined as a source of stress (Hobfoll, Vinokur, Pierce and Lewandowski-Romps, 2012; Lawrence, Halbesleben and Paustian-Underdahl, 2013) that the employee attempts to buffer from their employment role. Some research within the area is widening the scope and including families in their research (Grzywacz and Marks, 2000; Matthews, Priore, Acitelli and Barnes-Farrell, 2006; Duxbury and Higgins, 1991). This is still limiting research to just two perspectives within the work family interface: that of the organisation and the employee.

This thesis argues for the study of the third perspective within that buffering/balancing dynamic; that is the family perspective. This goes beyond simply what the individual can lose or gain from their family member within that bi-directional relationship. Literature has attended to the role of family enrichment; that is the energy, mood, time, mastery, support and other resources that employees can gain from their family (Ryff and Singer, 2008; Greenhaus and Powell, 2006; Lingard and Francis, 2008). These resources enable the employee's resilience and well-being, in turn facilitating their engagement with work. This thesis will go beyond that argument and suggest the dynamic goes beyond the employee to the family experience. If the Fire and Rescue Service has a set of unique stressors and impacts on the employee and their family (as outlined in the previous chapter and detailed in the rest of this chapter), understanding the family's perspective would provide insights as to how the organisation can encourage a collective positive gain of those resources for their employees, their families and ultimately their organisation.

The family perspective as a phenomenon has been indirectly highlighted through arguments claiming that coping and support of the family influences the ability of the employee to manage the bi-directional conflict between work and family (Adams, King and King, 1996). Stoner, Robin and Russell-Chapin (2005) included participants' spouses in their research in order to address the 'complicating variable' of a supportive spouse who buffers and moderates family demands on the employee. Bolino and Turnley (2005) also included participants' spouses, but that was for measurement and methodological reasons, rather than focussing on family members per se. The focus of research on work-home interface should encompass family dynamics as well as the families' perspective.

Family dynamics (such as a moderating and buffering spouse) influence the resilience and resources of the employee to manage the interface conflict. Barnett, Gareis and Brennan (1999) argue that family (as opposed to individual) coping strategies should be considered when studying the 'fit' of employees between work and family. Perrewé, Hochwarter and Kiewitz (1999) suggest that the research exploring the work family interface should focus on the family perspective, paying particular attention to the influence of a family's values on an employee's ability to manage conflict between the two domains. Expanding the area of research to include the family perspective is supported by Lewis and Cooper (1999); they extend this by suggesting that research should conceptualise the impacts on the family of work spillover from their loved one's employment. This echoes the much older call of Burke, Weir and DoWors (1980, p. 253) to examine how work demands can impact beyond the employee and "into the lives of their spouses".

These calls for a shift in attention have directed a small proportion of research in this area. However, this has mostly been acknowledged through a cursory nod in method design; for example, including spouses in rating work-home spillover, rather than re-directing the focus of research to the employee's family network. If researchers are committed to informing organisations and the workforce as to the effective ways to manage this spillover, the family's role should also be included in that understanding.

Although literature does incorporate aspects of family dynamics (Eby, Casper, Lockwood, Bordeaux and Brinley, 2005; Voydanoff, 2005; Standen, Daniels and Lamond, 1999), these studies are restricted (as per tradition) to the perspective of the employee only. Family roles and home working are exclusively explored through the employee. This continues to ignore the perspective of the family and how they cope with spillover from the work domain (of energy, mood, time etc).

As a consequence, the literature offers very little academic, empirical work outlining the impacts on, and management of, this spillover by families. The literature that does exist typically uses families of personnel in critical occupations (military, police or fire service). This literature

primarily developed not from the study of the work-family interface, but through the literature on families providing social support following occupational (Jackson and Maslach, 1982; Beehr, Leonor, Johnson and Nieva, 1995) or traumatic stress (Menendez, Molloy and Magaldi, 2006; Linkh, 2005; Pfefferbaum, Tucker, North, Jeon-Slaughter, Kent, Schorr, Wilson and Bunch, 2006; Manguno-Mire, Sautter, Lyons, Myers, Perry, Sherman, Glynn and Sullivan, 2007). Consequently, this does not answer the call for a family perspective study which contributes to the work-family interface literature. Therefore the call still remains for research to: (A1) identify the nature of these resource impacts on relatives and what are their effects, and (A2) mechanism by which these occupational impacts affect relatives. This thesis explores these research questions using a critical occupation sample in line with previous research; specifically, families of operational firefighters.

There is some literature exploring the impacts of spillover from wider critical occupations within the UK (see Crank and Caldero, 1991; He, Zhao and Archbold, 2002; Beehr, Johnson and Nieva 1995; Toch, 2002; Youngcourt and Huffman, 2005). However, with the exception of Marcucci (2001), it is exclusively relating to police officers and again focuses on the employee's perceptions of the possible conflict between work and home. Whilst this offers some guidance for policy makers and managers in the FRS, the emergency services operate and function in different ways (Brunsden, Hill and Maguire, 2013), leading to different experiences for families of FRS personnel.

Literature exploring the family perspective of Fire and Rescue Service (FRS) work remains a neglected area of research in the UK. There has been work completed in other countries; Regehr and colleagues (2003; 2005; 2009) conducted research with Canadian relatives of firefighters, whilst Kirschman's (2004) work was completed with American relatives of firefighters. Despite this different cultural context, such work has been useful in illuminating some key factors for attention, but the need remains to explore these issues in the specific context of the UK due to the different roles the occupation delivers to the communities of these three countries.

In Canada and America, the Fire Services' shift systems, training processes, organisation, funding origins/distribution and hierarchy are very different to the UK. The role is also different for firefighters in America and Canada as they respond to medical emergencies as well as fire and rescue emergencies as their remit includes both. The work carried out in the Fire and Rescue Service in the UK has been policy and best practice reviews (Eyre, 2006a; 2006b; Hill and Brunsden, 2007). Accordingly, research should explore differences in the (C6) experiences of firefighters' relatives in Europe with the experiences of those in North America.

3.3 Impact of Critical Occupations on Family

Previous literature examining relatives of firefighters has mostly used qualitative research (e.g. Regehr, Dimitropoulos, Bright, George and Henderson, 2005). Data from twelve spouses of firefighters in Canada yielded four main themes; firefighting as a profession (the pride that spouses, children and society have in the firefighting profession), shift work and family (the loneliness and confusion that shift patterns can bring to spouses, children and the family unit), social supports (the close co-worker network firefighters have and the subsequent isolating effect this has on spouses) and responding to stress and trauma (the management of traumatic reactions). Although informative, this Canadian study cannot be generalised to the UK, highlighting the need for research focussed on the UK. Noran (1995), based in the United States, conducted a review of literature focussed on wives of firefighters; her paper highlighted a dearth of literature and knowledge in this area, Noran's review comprised thirty relevant papers, only eleven of which actually focussed on firefighting. Noran suggested that shift work and risk perception were the two areas which impacted most upon the spouses of firefighters, supporting findings of the small existing literature (Grosswald, 2002; Barling, 1990).

The individual way in which their firefighter responds to these challenges affects the nature and extent of these impacts on the family. One of the factors affecting the experience of relatives is the personality and/or individual experiences of their firefighter. Firefighters have been identified as having 12 personality traits. Mitchell and Bray (1990) suggested that emergency workers (and therefore firefighters) have the need to be needed, in control, to rescue, to seek stimulation, novelty, risks, to obtain immediate gratification, have a high level of empathy, are internally guided, traditional, socially conservative and become bored easily. As well as these personality traits, emergency workers also have a denial of need for assistance. The study also suggests that obsessive perfectionism and compulsive behaviours drive firefighters and emergency workers.

However this suggestion by Mitchell has been widely criticised within the literature, most notably by Wagner (2005) who concludes that there is no 'rescue personality'. She and others (Paton, 2003; Gist and Woodall, 1998) have suggested there are differences between the critical occupations which Mitchell ignores by clustering within his sample populations inappropriately. This has been echoed elsewhere in the literature, but not as a specific focus of this debate (Dean, Gow and Shakespeare-Finch, 2003).

There is some debate within this literature about what the identified 'difference' in personality is compared to. Whether the differences are between emergency workers and the lay public, or whether the difference is between the emergency service occupations (between police, fire, paramedic personnel), researchers in this area accept there are commonalities between firefighters as well as a number of individual differences due to personality and individual

personal circumstances. McCammon et al. (1988) suggest that a firefighter's occupational demands are unique, and coping needs to reflect duty-related tasks, trauma exposure and their rescue 'roles'. Society views the fire service as heroic rescuers; the public relies on the fire service to execute tasks that an average person would find daunting or attempt to escape from. This was exemplified in media reports after the September 11th terrorist attacks where New York firefighters were held in a hero stature (Dougherty, 2001; Gregoriadis, 2001; Morse, 2002). As Britton (1989) explores, the media's point of view is very influential as to what society perceives as heroic. Kaprow's (1991) work, completed before 2001, demonstrates that the heroic status of firefighters predated events in 2001. Kaprow discusses the division between being seen as heroic and being seen as having poor judgement to undertake the job in the first place. However, she does conclude that the majority of the public hold the tasks which firefighters undertake as difficult or to be feared in some way and therefore define them as heroic.

The fire service members are trained to undertake such tasks; they do not usually report their occupation as having heroic connotations (Charman, 2013). However, the relatives of firefighters do not have the same occupational circumstances, the same 'firefighter personality traits' (Paton, 2003; Gist and Woodall, 1998) and therefore we cannot assume that relatives cope in the same way as firefighters. Accordingly, extrapolating the firefighter literature onto relatives would not be sufficient. The argument has been echoed in the policing literature. Jackson and Maslach (1982) used a sample of police spouses, distinguishing different coping behaviours that the relatives used compared with their police officers. This was in the context of duty-related stresses (particularly occupational stress and burnout) and spillover into the home environment. Therefore this thesis has researched the relatives of firefighters to distinguish their resources for maintaining resilience and well-being, with the resources used by firefighters being documented elsewhere (Regehr, 2009; Regehr, Hill, Knott and Sault, 2003; Hill and Brunson, 2003; 2009; Beaton, Murphy, Johnson and Nemuth, 2004).

3.4 The Work-Home Interface and Patterns of Working

Having highlighted the organisational context in chapter two (sections 2.2, 2.3 and 2.4) this section will now provide a context to integrate the family-work domain, exploring the specific nature of the firefighter's working environment in the UK.

One of the salient work aspects of firefighters is a shift-based working pattern. The impact of this working pattern has been documented in previous literature surrounding the Fire and Rescue Service (Cowlshaw and McLennan, 2006; Takeyama et al., 2005; Regehr, 2009; Wagner and O'Neill, 2012; Handy, 2010).

Most fire service personnel work shifts that might be a four day combination, flexi-duty shifts or on-call shifts. This has an impact upon the family life as they are irregular; even the standard shift rotates on an eight-day cycle, meaning that any routine is established around the eight day

shift rather than the seven day calendar week. Barling (1990) suggests that these types of shifts remove the firefighter from their family roles and family life when they are needed most throughout a typical day. Consequently this move away from societal pattern increases the complexity of the work-home interface beyond that of a typical nine to five day worker. The impact of shift work on marital and parental relationships has been explored and well documented in the literature (Grosswald, 2002; Jackson and Maslach, 1982; Mikkelsen and Burke, 2004; Youngcourt and Huffman, 2005; He, Zhao and Archbold, 2002; Roberts and Levenson, 2007; Beehr, Johnson and Nieva, 1995; Fratesi, 1998). Schumm, Bell and Resnick (2001) suggest that shift work can influence parenting as achieving a set amount of hours per day within the role of parent is interrupted by shift work. Establishing the impact and effect of this pattern of working (A1, A2) will enable academic literature to provide FRS with advice on how to support relatives to positively respond to impacts in an effective way (B5); consequently offering a unique contribution to the research area.

3.5 Conclusion of Work-Family Interface Literature

The work-family literature was reviewed in order to establish how the academic literature of work-home interface has been applied to support firefighters and their relatives. In summary, the research aims of this thesis relating to the work-family interface were plotted within the discussions of the literature to enable the reader to see where these questions align to opportunities identified in the literature. To understand the possible mechanisms in place to support relatives and firefighters, it is necessary to consider the family, family dynamics and reactions to impacts/stressors.

3.6 Theoretical Consideration of a 'Family'

The term 'family' can include many forms and adaptations from the traditional 'nuclear' family that is often represented within society; kin and non-kin family, adults, children, immediate family and extended family (McKie and Callan, 2012). These authors suggest that despite the many variations, there are some common features of families. Family is the primary social group, usually formed by a collection of people who share some common factors; these might be biological, social or experiential. Families usually have a structure (who does what for whom) within which processes take place (the dynamics of what is happening). These contribute to the way the family functions; family functioning is a key tool in accessing the well-being of the family as a whole and also those who exist within it. Family functioning represents the systems which the family adapts in order to organise and progress their shared tasks, communications, activities and procedures (Crosbie-Burnett and Klein, 2013)

Since the early influential work of Moos and Moos (1978) of family typology, many researchers have contributed to the development of theory within this area (Crosbie-Burnett and Klein, 2013). However there are several features in common amongst most of these theories which include the family's ability to adapt their ways of working to new challenges and situations

(adaptation), the ability to maintain their interpersonal relationships in the face of challenges and change (elasticity), the ability to recover quickly from challenges or threats (buoyancy) and their ability to share resources between each other in order to support the family as a whole or individuals within the family to maintain resiliency and protection from threats (resilience).

One cautionary note when trying to evaluate the theories of family functioning is that the underpinning research does not draw from one definition of ‘family’, there are many variants of a family (Crosbie-Burnett and Klien, 2013). This limits a direct comparison. However, the theories of family functioning will now be evaluated as they still offer useful insights, notwithstanding this limitation.

3.7 Family processes

One of the ways in which family process can be explored is by following the position of Moos and Moos (1978) who studied and defined the typology of family social environments. Their findings suggested six distinct clusters of families. The cluster with the highest numbers of families within it was the Conflict-Orientated family. The table below presents the clusters in descending order of occurrence within their research.

Table 3.7.1 of Typology of Families (Moos and Moos, 1978)

Cluster Name	Definition
Conflict-Orientated family	“a lack of concern and commitment in their families and a lack of mutual helpfulness and support. Anger and conflict is expressed in the context of generally cold and distant relationships among family members” (p. 365).
Independence-Orientated family	This type of family are distinct from the other five types through their tendency “to be assertive and self-sufficient, to make their own decisions, and to think things out for themselves” (p. 362).
Achievement-Orientated family	This family typology is defined from the other five types through their particular interest “in working hard and getting ahead in life” (p.362).
Moral/Religious-Orientated family	This larger cluster is formed through two subsets of families; however both are defined through their consideration of ethical and religious issues alongside their focus on intellectual and cultural activities.
Expression-Orientated family	The defining feature of this type of family is that they are “encouraged to act openly and to express their feelings directly” (p.362).
Structure-Orientated family	The distinctive feature that sets this type of family apart from the other five is that “There is a hierarchical structure of family organisation; however, control is not manifested in a rigid, autocratic manner” (p.362),

This typology of families can be used to try and establish dynamics within families and to define the kith/fictitious families of UK FRS personnel. Moos and Moos suggest that this typology and published work on 'traditional' kin families can be related to fictitious 'kith' family environments.

3.8 Fictitious families

Through the work of Moos and Moos (1976), it has been suggested that different types of social environments and living conditions can develop family processes. This allows exploratory research on the Fire Service Family (the watch, the family and the family members of other watch members) as a 'traditional' family. These are evidenced in the work of Jackson and Maslach (1982), Regher, Dimitropoulos, Bright, George and Henderson (2005), Rowe and Regehr (2010), and Kirschman (2004) and Kirschman (2006) who suggest the need for families of emergency service workers to share their experiences in order to support and cope with the occupational demands which impact upon family life. Research by Burke, Weir and DuWors (1980) suggest that spousal satisfaction is increased by participation in social events and groups. Although research conducted using non-fire service populations are insightful, and can serve to inform thinking about families of firefighters, there are some occupational demands of firefighting which disrupt family life indirectly. For example, shift patterns prevent a standing commitment to regular social events (as suggested previously), altering family dynamics. Demonstrating the nature of impacts identified in this chapter create unique circumstances for relatives of firefighters.

3.9 Stress upon the Family

Excluding traumatic reactions, there has been some focus on the every-day effects of work on the family life on non-critical populations (Barling, 1990; Repetti, Wang, Saxbe, 2009). This suggests that work stressors and spillover have an effect on both marital and parental functioning. This is echoed by Bumpus, Crouter, Maguire and McHale (1990) who suggest that the work experiences of one parent can affect the relationships between all family members. This has also been evidenced in police populations (Roberts and Levenson, 2001; Beehr, Johnson and Nieva, 1995). The effect of firefighting has also been suggested by Regehr (2009) to impact on relationships in other ways such as the firefighter using emotional numbing or distancing/avoidance from the family, which is compounded by the shift patterns. These findings, coupled with the findings in the wider, general population, suggest that firefighters could be perceived by their families to be physically or emotionally disengaged from family life.

Boss and colleagues (for a review of this work, see Boss, 2004) have defined this physical or emotional disengagement as ambiguous loss. This is when a family member is either physically absent, but psychologically present, with the family, or physically present and psychologically absent. The psychological absence may be through being emotionally unwell, such as experiencing depression or traumatic reactions. This absence of the family member impacts on the rest of the family.

One threat that families face is that of stress. Following on from the work of Seyle (1930s through to 1950s), stress was further defined by Lazarus and Folkman (1984). Although there are other theories of stress (such as the MASH biopsychosocial approach), the common factor between most of this research suggests that stress occurs when an individual or family establish that they do not have enough resources to cope with a threat. The two main forms of stress families' face in western cultures are occupational stress and traumatic stress (Boss and Mulligan, 2003). Occupational stress can be a physical, behavioural and/or psychological reaction to a stressor identified within a place of work. These stressors could be episodic (a one off highly demanding event, such as a thorough inspection of a department) or chronic (continuing over a long time period, such as constant poor computer performance). Stressors tend to be clustered around the areas of workload, role conflict, role definition/ambiguity and job demands (Kahn and Byosiere, 1992).

The other form of stress that impacts on families is traumatic reactions; although this is not as prevalent as the experience of occupational stress, the effect upon the individual and family is arguably as great or greater by the very definition of the threat, and the situational, personal variables specific to that family (Hill, 1958). According to the diagnosis in the DSM V (2013) post-traumatic stress disorder is the most extreme reaction on a scale of post traumatic reactions. All the reactions recorded on this scale follow an event which is distressing by its very nature; where the individual feels that their life or the lives of those around them have been threatened.

Both types of stressor have an impact through an individual to a family, through emotional contagion or transmission. This is the passing on of emotions or mood states from one person to another through interactions (Hatfield, Cacioppo and Rapson, 1994 see section 3.16). This has been evidenced to occur within families every day (Larson and Almeida, 1999; Roberts and Levenson, 2001) and within types of stressors and occupation specific contexts (Thompson and Bolger, 1999; Long and Voges, 1987).

Common across research in this area is that these stressors pose a significant threat to the family's resources and put strain on the family structure and processes (Hobfoll and Spielberger, 1992). This challenges the family's elasticity, buoyancy and resilience, and may result in the need for adaptation. The individual, the family and the community can draw across resources from all three tiers in order to cope with the strain; these common pooled resources are called resource caravans (Hobfoll, 1998 see section 3.27) and typically social support is a factor that is present within each of these tiers, allowing the individual and family to increase their resources by buffering the negative impact of threats (Schumm, Vranceanu and Hobfoll, 2004).

Research has established a consistent link between stressors and negative effects within the individual and the family. However, research is now also focussing on the positive aspects of resilience (see section 3.25) within a family as well as the positive resources that can be brought into a family by an individual. These could be used to protect family functioning facilitating resilience, mastery and increasing well-being (see section 3.26) within families.

3.9 Conclusion of Theoretical Consequences of the Family Literature

In summary, the literature offers directions for future research. The eclectic definition of a family allows for the study of both kith and kin family structures and functioning. This is necessary to explore the unique set of circumstances within which relatives of firefighters live. These situations expose the family to threats such as traumatic stress reactions through the role of the firefighter. The nature and impact of that traumatic exposure will be discussed in the following section.

3.10 Traumatic reactions

One main focus of previous research focussing on the firefighting community has been the traumatic reactions of firefighters and the subsequent effect on their families. This is because it is reasonable by the nature of their role to expect that firefighters and other emergency service workers to be exposed to traumatic events at some point throughout their career, and to have the physical resources to cope with those events, but may not have psychological tools that are as well developed (Perrin, DiGrande, Wheeler, Thorpe, Farfel and Brackbill, 2007). Most literature has focussed on the most extreme stress reaction of Post-Traumatic Stress Disorder (PTSD). The Diagnostic and Statistical Manual (DSM V) (APA, 2013) definition describes a combination of symptoms which emerge after exposure to a 'traumatic event'. Alongside this has been a focus on the comorbidity such as substance abuse, and associated symptoms such as cognitive impairment, physical health impairment and negative impacts on social relationships. In order to contextualise the research focussing on the family members in the previous section, the literature surrounding the traumatic and emotional reactions of firefighters should be explored.

3.11 Traumatic and emotional reactions of firefighters

Longitudinal studies of PTSD have shown that symptoms can persist long term (McFarlane, 1988). McFarlane (1992) used firefighters to study the contribution of avoidance and intrusion in PTSD. The results suggest that intense reoccurring memories of trauma are as indicative of disturbed mood and arousal as the initial exposure to the trauma. It was also suggested that avoidance does not prompt symptoms, but acts as a defence mechanism which contains the distress of re-experiencing the trauma through intrusion (Hyman, 2004). This research provides context as to why avoidance is influential in PTSD and an individual's reaction and coping mechanisms. Research into coping styles supports this; Spurrell and McFarlane (1993) suggest

that coping styles are not only used to contain re-experiencing of the trauma, but also to manage environmental adversity.

Joseph, Williams and Yule (1992) suggest through two different questionnaires that an effective coping style may be a product of increased social support and therefore, perceived control. Results infer that if an individual does not receive as much social support after a trauma as they would expect, this can have profound effects. This difference in perceived and received social support was studied by Kaniasty et al. (1990) who found perceived support outweighed received support, highlighting expectations which the public hold in the event of a trauma. Jenkins (1997) researched into coping and social support among emergency service dispatchers during Hurricane Andrew. The researchers make parallels to field workers' distress and pointed out that, for both these groups, the disaster occurred in the participants' home community and they therefore became victims themselves. The quantitative study suggests the influence of 'third variables' which could have influenced responses; these include the participants' family roles due to the proximity of the incident to their own life and family. This reflects the argument previously explored that the family domain makes a significant contribution to the resilience and well-being of firefighters.

Years of service and coping through training are also documented (LeBlanc, Regehr, Jelley and Barath, 2008) as coping strategies. Also referred to as a buffer, hardiness is suggested to be a personality style or personality trait (Bartone et al., 1989). Hardiness has been found to facilitate both long term and short term outcomes following traumatic events (Waysman, Schwarzwald and Solomon, 2001). Pengilly, Wyatt and Dowd (2000) suggest that hardiness moderates the relationship between stress and depression, two aspects of associated symptoms of traumatic reactions. Self-efficacy can both decrease and increase in emergency workers when their familiar defence mechanisms are threatened (Orner, 1995). Ritualised coping mechanisms may be undermined leading to heightened vulnerability to stress reactions and decreased self-efficacy. Research from Andersson, Dahlback and Allebeck (1994) used a non-firefighter sample; findings suggest that individuals perceived trauma as a threat against their physical existence and a violation of their social and personal integrity. This leads to feelings of stress and vulnerability as individuals confront their own mortality. Markowitz et al. (1987) researched psychological responses of firefighters to a chemical fire; findings suggested that, after exposure, firefighters reported an increase in perceived threat to physical health and also an increase in psychological and emotional distress.

Considering firefighters are expected to experience traumatic events within their role (Baxter, 2013; Skogstad, Skorstad, Lie, Conradi, Heir and Weisaeth, 2013; Prati and Pietrantonio, 2010a; Regehr, 2001, Wagner and O'Neill, 2012), the use of these coping mechanisms may influence their interactions with their family members throughout their careers.

Aside from the coping strategies used by firefighters to deal with traumatic exposure during their careers, there are other aspects which may influence the development or 'nature' of their traumatic reactions. Murphy et al. (1994) identified that, even when age is controlled for, increased years of experience leads to decreased job satisfaction, morale, goal attainment and burnout. There are, however, different time frames and presentations of trauma; for example, minimal trauma but at high frequency, "accumulative stress", contrasted to maximum trauma with only one or two exposures, "cumulative stress" (Mitchell, 1990). Research has not indicated whether this has an effect on trauma symptomology. Fullerton et al. (1992) researched psychological responses of rescue workers. A special firefighter unit performing rescue missions in New York City (constant exposure to low level trauma on a regular basis) were contrasted with firefighters who had recently responded to a mass casualty air disaster rescue in Sioux City (previous low level exposure plus one incident of high level exposure). The different natures of trauma experienced would suggest there are different reactions and responses to trauma. If these were identified and defined then more could be done to aid firefighters (and therefore their families) through their experiences, whatever the level of traumatic exposure. This would aid in reducing absenteeism and early retirement and maintaining the mental health of the fire service as an agency. It would also help to inform families of why firefighters could be expressing traumatic reactions in different ways.

From the literature reviewed so far within this thesis, traumatic stress has been identified as being managed by availability of social support from the family. This aspect of support will be explored later in this thesis (sections 3.14) as well as the social support from the firefighters close co-worker network (section 3.13). First, the nature of traumatic reactions within critical occupations will be discussed in further detail.

3.12 Professional trauma

Most of the literature above has used the critical occupations as a population to research traumatic reactions. The direction of research into trauma within firefighters (Paton, 2006) has suggested that there are differences between trauma research undertaken with members of the public experiencing a one off traumatic event ('lay' trauma) and the 'professional' trauma which critical occupations are exposed to as a routine part of their career. Most trauma research demands that participants anchor to 'the event' which caused the traumatic reactions. However, with emergency service workers there is usually more than one 'bad job' or event that they anchor their reactions to. Whilst recognising the areas of shared pathogenesis between the populations, there should be some acknowledgement of different aetiology and pathology from the trauma literature relating to the general population or 'lay people'.

3.13 Social support for firefighters from peers

The members of a watch in the fire service work closely together by the nature of their job, and firefighters themselves prefer to work in this tight co-worker network (Neale, 1991). The threat

that trauma or injury could happen to members of the team concerns firefighters. Beaton et al. (1998) tried to identify variables associated with posttraumatic stress symptomology through ranking stressors. Although identifying the firefighter's colleagues as important, the use of questionnaires in that study did not provide an understanding of why this was the case. There is also the factor that injury to self or co-worker whilst on duty has other implications. Landsman et al. (1990) used questionnaires with a non-firefighter sample and suggested that any intervention in this situation should acknowledge subjective perceptions of the accident and implications, and family and social support. The fire service is aware that early retirements due to injury on duty are costly of every resource (emotional and economical). The Chief Fire Officers Association has published a guide for policy in recent years to guide FRS' should this situation arise (CFOA Publications, 2013).

This tight co-worker network or working unit spans into other areas; for example, because the firefighters operate in a 'watch' they are part of a team, both operational and emotional. They also have their managers and organisations who form part of their social support structure (Regehr, 2001).

Coping strategies within the firefighting population are explored both at events and after, and also at a group (watch) and individual (firefighter) level. Coping strategies and years of service have a direct influence upon the experience of traumatic reactions of firefighters (Beaton et al., 1999). Their results suggest that length of service predicted changes in self-reports of post-traumatic stress symptomology. However, the nature of this relationship, between length of service and coping with stressors, has been questioned by other research (Regehr, Hill, Knott, and Sault, 2003; Wagner and O'Neill, 2012; Chamberlain and Green, 2010).

Evidence suggests that in the context of their peer group, the watch use humour as a group short-term coping strategy at the scene of an incident (Rowe and Regehr, 2010; Charman, 2013). Dyregrov and Mitchell (1992) identified humour amongst a range of coping strategies (including being active, suppressing thoughts and feelings, mutual support, avoidance, training, regulating exposure, purpose to complete and humour) and Alexander and Wells (1991) found that 98% of police officers working in the mortuary after the Piper Alpha sea disaster used humour as a defence in order to cope. Humour has been found to facilitate coping and adjustment to the situation, a way of gaining control again and a form of communication (Henman, 2001). However the effectiveness and frequency of using humour to cope by emergency service workers is debated. It may serve as an avoidance technique (Kupier, Martin and Olinger, 1993) or some literature suggests it could have a "buffering effect" in coping with stress (Healy and McKay, 2000; Sliter, Kale and Yuan, 2014).

Firefighters frequently turn down formal psychological opportunities commonly citing that they work in a team and therefore use each other as counsellors (Hill and Brunsdon, 2009).

However, as Parkinson (1993) points out this is 'defusing' not 'debriefing' and suggests that this attitude is heightened when women are present as the male members feel that they have to cope in front of women (Brunsdan, Hill and Maguire, 2014; Herbert, 2001; Conley, 2002). The exclusion is not just limited to female members of the watch; Varvel et al. (2007) suggest that coping can become the exclusive function of the watch and can exclude family members. However, they conclude that this is because of shift work; a firefighter may not see their spouse or children for three consecutive days if the family is at work or school during the day and the firefighter is working a night shift. This reliance on the watch is reflected in other research (Bacharach, Bamberger and Doveh, 2008), alongside some negative coping behaviours, such as drinking alcohol. This could also be initial short-term coping strategies (rather than long-term coping strategies) which have been found in research elsewhere (Hill and Brunsdan, 2009). This suggests that firefighters gain different forms of support from different constituent groups within their social networks.

Considering the need for firefighters to receive social support from both their watch and family, the inference suggested by Schumm, Bell and Resnick (2001) in military family support, assumes that the firefighter, the watch and the family are inter-related systems. This is a premise that research needs to consider further to explore if the coping mechanisms identified at work are used at home. If not, then research needs to identify how they differ and in what ways they are similar. By exploring and understanding the family based support used to maintain resilience and well-being within firefighters, and aligning those findings with the co-worker network findings, it will confirm if support from these two groups have any common ground.

3.14 Traumatic reactions and family members

Having established how traumatic events impacts upon firefighters and their emotional well-being, it is reasonable to assume that the spillover from the firefighter's well-being may have an effect on their family. This is through the firefighter displaying these reactions after a shift at work, or for a more sustained period of time. Research could determine if there is a difference or a relationship between reactions that are anchored to one incident, compared to a reaction displayed over a sustained period of time which is not anchored to any one incident but is cumulative. Establishing if there is any difference in impact on the family would parallel research conducted on different types of exposure and their effect on traumatic reactions of the firefighters and other critical occupations such as police officers (McCaslin et al., 2006).

The presence of traumatic reactions within the families of emergency service workers has been evidenced in the literature (Regehr, Diitropoulos, Bright, George and Henderson, 2005; Regehr, 2005; Pfefferbaum et al., 2006; Menedez, Molloy, Corrigan Magaldi, 2006; Fratesi, 1998), and some have tried to identify the route of reactions present in the families. For example, are they coming through the firefighter's talk to impact on the family, or are they passed through the

firefighter's moods. It is not sufficient to research post-traumatic stress disorder, nor acute stress disorder, as these are the very extremes on the scale of traumatic reactions (DSM V APA, 2013). It is rare that firefighters themselves experience such a high level of reaction despite the pathology of firefighters in the psychological literature. Therefore expecting to see these high levels of reactions within the families would not be a logical assumption. Investigations should be concerned with low-level traumatic reactions instead such as traumatic reactions, rather than testing for posttraumatic stress disorder within families.

Research with non-firefighter families has identified that emotions can transfer within a family unit from family member to family member (Hammer, Neal, Newson, Brockwood and Colton, 2005; Thompson and Bolger, 1999). Repetti, Wang and Saxbe (2009) suggest that stressors can also be transferred between family members and that, if this is repeated and persistent over time, it can cumulate to have a negative effect on family health and functioning in the long-term. Specifically, looking at the transfer of traumatic reactions, the family unit can be affected without all the family members being present at the traumatic event or incident (McFarlane, 1987); this phenomenon has also been considered in the work on ambiguous loss by Boss and colleagues (see Boss, 2004, discussed in section 3.9).

Despite the recognition of the transfer of emotions and stressors happening within non-firefighter families, studies using relatives of firefighters have mostly focussed on traumatic reactions and specifically on large-scale disaster work such as the events in New York on September the 11th 2001. Pfeffbaum et al. (2006) focussed on the reactions of partners of firefighters following the Oklahoma city bombing. Menendez, Molloy and Magaldi (2006) focus on spouses of firefighters after the World Trade Centre events on September 11th 2001 and Duarte et al. (2006) focussed on children of emergency service workers after the same event. Consequently, this becomes an issue as all research into traumatic reactions, any investigation or measures of reactions, should try to account for what the traumatic reaction is anchored to. This ensures that traumatic reactions are loaded on an event or incident relevant to the sample selection criteria. For example, if the families were to be measured for their levels of traumatic reactions and an anchor was not identified, then they could be anchoring (and therefore responding to the research) in the context of an experience in their wider life history, rather than in relation to the occupational spillover from their spouse/sibling/parent/child. Thus, the clarity of the findings are threatened as the relatives could be anchoring to something they have seen on the news and reacting to that event vicariously, rather than through transmission from their firefighting family member. So there could be a dual pathway of traumatic reactions (media impact plus firefighters reaction). This does not offer insight in to levels of traumatic reactions anchored to events without media coverage seen in families of firefighters.

Aside from the research focussing on large-scale incidents, the literature offers research documenting coping within and between firefighter couples. Monnier, Cameron, Hobfoll and

Gribble (2000) completed psychometric research on couples in the USA that have a serving firefighter within the couple. The study was less focussed on the occupation and more on establishing coping behaviours, particularly prosocial and antisocial coping. The authors were not interested in the Fire Service per se; rather they selected this population to recruit from due to its definition as a high-stress occupation and the perceptions that it is dangerous, complex and stressful for family life. One important point to note here is that the population are fire-emergency workers, these are firefighters who also deliver first aid or life-saving skills. Therefore the nature of the job changes when compared to UK firefighters and therefore the assumptions from this study and its findings cannot directly extrapolate across to UK firefighters. However, the findings suggest that crossover effects of individual coping to relationship functioning are seen between romantic couples. These crossover effects (such as anger) can reduce the emotional health and well-being of the firefighter by disrupting the relationships they have following exposure to a traumatic incident. The paper calls for further research to attend to the well-being among this population of firefighters and their families, this thesis addresses this issue.

Menendez, Molloy and Magaldi (2006) suggest that the female spouses of firefighters are more susceptible to developing stress from critical incidents than male spouses. Their suggestion comes from the finding that females rely on their social support within their community. Therefore when they draw on this support in large-scale events, the support network itself is also experiencing trauma and so it adds to their trauma rather than providing resilience. However, aside from being anchored to a large-scale incident (criticisms of this type of research study are discussed above), these authors are also basing this premise on the majority of spouses of firefighters being female. In the UK there are more serving female firefighters than the country this research was completed in, and therefore more male spouses. This research therefore does not inform this context fully as it only drew upon male-female partnerships and it focussed on sex-specific coping behaviours, rather than identifying wider dynamics of firefighting relationships. They also highlight the need for recognition of the women in the research as 'caretakers'. Although used predominately in the physical sense (working full time away from the home and then completing unpaid work within the home), they highlight a similar concept to Manguno-Mire et al., (2007) and their exploration of caregiver burden. This highlights the shared loading of stress between spouses and the need for research to understand that shared load in order to offer insights for effective support.

Alongside studies of spousal experiences linked to specific events, research has also explored experiences of other family members within the context of the armed forces. Scaturro and Hayman (1992) examine cross-generational trauma from combat and alongside Rosenheck and Nathan (1985) suggest that 'secondary traumatization' can be seen in children of combat veterans. They propose that this is developed from "frequent marital conflict, domestic violence, separation, and divorce" (pg. 280). This infers the traumatic reaction comes from negative

reactions within the home and between the family members rather than being anchored to a specific event and then transferred between family members from one individual.

The limitations of anchoring to large-scale disaster work within this research will be discussed in the following sections as the theoretical explanations for the presence of trauma within relatives of firefighters are presented. There are three main approaches which offer accounts to explain traumatic reactions identified in the families of firefighters: one is anchored to a shared event, and the remaining two are anchored to the reactions within the firefighters themselves.

3.15 Vicarious Trauma

Literature exploring traumatic reactions in the families of firefighters have hypothesised that families experience vicarious trauma (Menendez, Molloy and Magaldi, 2006) to critical incidents that their firefighters attend (this research was conducted on a large-scale event). This type of trauma is similar to post traumatic stress disorder (DSM V, 2013); there is again a presence of the three main symptoms of intrusion, hyperarousal and avoidance. There has to be an incident within which there is a threat to the life or well-being of self or another. Once again it is similar as it often leads on to associated symptoms, which include substance abuse, cognitive impairment, physical health impairment and impacts upon social relationships. The difference is that the individual was not present at the incident, but heard about it through another individual or witnessed the event through the media. This vicarious trauma is mostly seen in counsellors or control staff as they hear the reports of traumatic events but do not witness them directly (Badger, Royse and Craig, 2008).

The way in which this would be transferred from the firefighter to the family would be through a description of the event and talking to their family members in an attempt to mediate their own reaction (Regehr, 2009). The family members would therefore be having a traumatic reaction to the same incident, but through the firefighter's description. The traumatic response would be to the description of the event, the details portrayed to them by their firefighter about the incident. However, other theories (Hatfield, Cacioppo and Rapson, 1994; Motta, Kefer, Hertz and Hafeez, 1999) suggest that any reaction that the families have is not to the event per se (see discussion below of two more theories). This is predicated on the notion that both firefighter and the family will be demonstrating the associated symptoms to clinical levels. Whilst this is expected from such a large-scale incident with significant fatalities, there is very limited literature to suggest that this would be the case in more frequent typologies of incident which firefighters report to be distressing; such as the death of a child or gruesome injuries (Regehr and Hill, 2001; Beaton, Murphy, Johnson, Pike, and Corneil, 1999). If research were to be completed examining the firefighter and relatives' symptomology to the more frequent type of incident attended by firefighters (more routine road traffic accidents for example), it is predicted that the symptomology would not match the criteria of posttraumatic stress disorder reported in these large scale incidents.

The researcher believes that reactions of relatives will be focussed on the reactions of their firefighter rather than the event itself, providing that their firefighter is physically unharmed. The reactions that firefighters display, such as graphic nightmares, irritability or testiness, is likely to distress the relatives more than the incident. This suggestion is predicated on the hypothesis that whilst they listen to their firefighter, their appraisal of their firefighter's reactions will be assessed as more threatening than the incident. This phenomenon can be seen in research conducted on the spouses of military personnel diagnosed with PTSD (Manhuno-Mire, Sautter, Lyons, Myers, Perry, Sherman, Glynn and Sullivan, 2007). In this paper, the spouses assessed their combat veterans' emotional difficulties as a threat to their own, or their family's emotional well-being. If this was extrapolated to a sample of firefighters and their families, issues experienced by the family members would not be anchored to the event itself, but on the reactions and interactions their firefighter displays following the event.

Another criticism of the vicarious trauma explanation is that the studies exploring the concept are usually products of, or anchored to, the September 11th 2001 event at the World Trade Centre buildings. This is not a usual experience of a firefighter, and a unique experience for their family as no disaster of that nature had previously been experienced in the United States. In those cases, any reactions shown by relatives to the event would be vicarious trauma, as the description of the traumatic event has reached them through two routes: the events described through their firefighter and second the media. The media exposure has been evidenced to facilitate vicarious trauma (Blanchard, Kuhn, Rowell, Hickling, Wittrock, Rogers, Johnson and Steckler, 2004; Collimorea, McCabe, Carletona and Asmundsona, 2008), most people within those samples experienced this as the media coverage was repeated and detailed in the days following the event. These reactions increased in severity as participants' geographical location increased in proximity to Ground Zero. This is reflected in a study (Pfefferbaum, Tucker, North, Jeon-Slaughter, Kent, Schorr, Wilson and Bunch, 2006) whose authors advocated future research to recruit from samples of the population who were closer to the location of the traumatic event in order to test their findings. Research with non-firefighter families has shown that parents become over-protective following the experience of a disaster (McFarlane, 1987). This phenomenon could be an associated symptom which displays alongside traumatic reactions; some literatures term this 'secondary trauma' (Carlson, 1997). The same term is also used to describe other comorbid symptoms of the traumatic reaction. For clarity, this programme of research will only use the term secondary trauma to describe the reaction that the relatives have to the traumatic reactions of the firefighter.

Another criticism that can be levelled at these approaches is that they do not disaggregate the two descriptors of the event; participants' experience of the event through the media and their experience of the event through their firefighter's experience. Therefore they could be attaching vicarious trauma to their family member being a firefighter, when actually it is probably because

they saw that event in detail covered in the media as they were geographically close to that event, or had repeated exposure through the media. In a comparison study with a non-firefighter family sample, there is likely to be no significant difference in their reported levels of distress.

For those firefighters and families studied after September 11th 2001, the experience was very unique. Despite meeting the requirements of the DSM V criteria for 'a traumatic event', most surviving firefighters in the New York area were not in attendance at the event of the World Trade Centre. What spouses in these studies have anchored their experiences to is a long, protracted and dangerous search and rescue effort (Perrin, DiGrande, Wheeler, Thorpe, Farfel and Brackbill, 2007). Throughout the recovery work each partner would have anchored on to different 'life threatening events'. This contravenes the reaction to a homogenous event as family members would have anchored on to isolated events within the recovery work. Therefore they became the trigger points for the sample population, rather than the events on the 9th of September 2001. Most scales used to measure posttraumatic stress use one anchor event for the respondent to provide replies in the context of that event. Studies have written up relatives' distress as a homogenous reaction to a single event, and hypothesised on the transfer of traumatic reactions based upon this (Menendez, Molloy and Magaldi, 2006; Vogel, Cohen, Habib and Massey, 2004).

Studies involving individuals with a diagnosis of PTSD which have also included their relatives', support the position that vicarious trauma does not account for reactions within the relatives. TARRIER, Sommerfield and Pilgrim (1999) carried out research with relatives of individuals participating in a medical-treatment trial for PTSD. They did not find evidence for vicarious trauma within the relatives of their study, but called for further exploration to establish coping behaviours of relatives.

Considering this has been the focus of attention research has paid to establishing the route of traumatic reactions within families of firefighters, to accept this explanation would be neglectful due to the rare and extreme triggers of those reactions. Unique events with complex situations and mass fatalities are rare for the average career of any firefighter, despite the literature focussing on the types of events (Skogstad, Skorstad, Lie, Conradi, Heir and Weisaeth, 2013). Therefore, predicating explanations for the presence of reactions of families of firefighters on these studies is neither rigorous nor sufficient. Having outlined some limitations of this theory of family reactions to critical incidents, this explanation will be rejected and the other two theories will now be considered.

3.16 Emotional Contagion

Emotional contagion is different to vicarious trauma; emotional contagion or transmission is the passing on of emotions or mood states from one person to another through interactions. This has been evidenced to occur within families on a day-to-day basis (Larson and Almeida, 1999;

Barling, 1990; Repetti, Wang and Saxbe, 2009; Roberts and Levenson, 2001) and has been researched within stressor and occupation specific contexts (Thompson and Bolger, 1999; Long and Voges, 1987). Within this discussion, it is relating to the specific occupation of firefighting and the passing on of traumatic reactions from the firefighter to their family members. This is therefore not a reaction to the incident or event, but instead anchored on the emotional reactions of the firefighter. Emotional contagion of traumatic reactions developed from the established literature of generic emotional contagion (Hatfield, Cacioppo and Rapson, 1994). The generic emotional contagion literature has previously applied its theory to daily hassles and stressors, which focussed on occupational stress (see Hammer, Neal, Newson, Brockwood and Colton, 2006). This leaves some questions therefore as to whether it is applicable to a sample of firefighters.

The detail of the contagion is not simply the case that the firefighter comes home, is distressed and then the family become distressed; it is more selective and reactive than that. Through the literature review conducted by Larson and Almeida (1999) it has been established that emotional contagion is the sharing of a negative emotion which causes the spouse to experience a lower level of marital satisfaction. Their literature review also establishes that the contagion is not two-way between every member of the family. The flow of emotions generally comes from husbands to wives more frequently than vice-versa as women have more permeable boundaries than men. Doherty, Orimoto, Singelis, Hatfield and Hebb (1995) theorise this is because women are socialised to pick up on social cues and mood indicators more than men. Emotion flows from parents to children, but not from children to parents and fathers seem to be more frequent senders than mothers. However, a mother's emotions are more likely to be received by an adolescent. Therefore, these emotions are not broadcast indiscriminately to any family member, and the sharing of these emotions is not cyclical within the family. They are more targeted and directed to specific members/roles. This becomes relevant when considering the passing on of traumatic reactions from a firefighter to their family members as this infers some members of the family are more vulnerable to these reactions.

These emotions which are sent from family member to family member are mostly negative emotions (Siebert, Siebert and Taylor-McLaughlin, 2007; Westman and Etzion, 1995) negative emotions are more frequently transmitted than positive. Friends are more likely to transmit positive emotions to other friends than to their own family members. Literature has attempted to capture the content between sender and receiver (as reviewed by Larson and Almeida, 1999), scorn may be transmitted and received as shame by another (Brody, 1996) and anger might be transmitted by a sender and received as anxiety by a receiver (Larson and Gillman, 1999). This informs the context of the firefighting occupation as the content of reactions to traumatic events may differ between what is sent and received, and patterns of transmission may align with patterns of shifts due to family routines restricting contact between family members and their firefighting family member.

Larson and Almeida (1991) suggest that the moderators of these interactions could be: coping strategies which the family members could employ, alliances between family members to dilute or diffuse the transmission, and the possible increase in emotional resources available to the family to cope with the situation. One example of these emotional resources is 'distress containment' (Downey, Purdie and Schaffer-Nietz, 1999) where, if the negative emotion is anchored to an event, the family limit the negative sending and reception behaviours attached to that event. However, given that some family members are more susceptible to these transmissions; this would demand a complex, multi-level intervention to achieve this prevention. Having considered this explanation of traumatic reactions, this could provide a reliable account for the transmission of reactions between firefighters and their families.

3.17 Secondary Trauma

The third theory to account for traumatic reactions present in families of firefighters is focussed on the impact of the reaction of the firefighter. When defining the term secondary trauma, Figley (1998, p. 7) describes it as being "the natural consequent behaviours and emotions resulting from knowledge and a stressful event experienced by a significant other". This suggests that families do not have traumatic reactions to the incident (vicarious trauma), nor do they 'pick up' the reactions from their spouse (emotional contagion). Instead the suggestion is that the families have a traumatic reaction to the symptoms displayed by their firefighter. The mood swings, irritability, un-warranted aggression and the unpredictability (see McFarlane, 1987, for examples) which accompany the traumatic reactions of the firefighter is disturbing enough to warrant some level of traumatic reaction within their family members (Repetti, Wang and Saxbe, 2009).

This differs from emotional contagion as the reactions are traumatic reactions to the firefighter's behaviour and interactions, rather than an emotional reaction that then follows a pathway(s) to their relatives. For example, the secondary trauma explanation suggests that the firefighter has a traumatic reaction and the symptoms of this are toxic and cause a reaction in the family to the firefighters reactions. The other explanations covered previously suggest that the traumatic reaction the firefighter is having themselves travels to the family. Put simply, the latter is about establishing a pathway of symptom transmission from the event through the firefighter to the family, yet still anchored to the original event. Secondary trauma suggests the firefighter's symptoms, not the original event, cause the reaction in the family.

The nature and route traumatic reactions take to reach families of firefighters is an important issue to address. If the route can be identified, then this can be highlighted to firefighters and their families in order to reduce or minimise their effects. However there are other aspects to the families' experience of trauma other than their own reactions.

Reaction to the symptoms displayed by individuals with traumatic reactions is not contained to relatives of emergency service workers. Research completed on families of armed forces personnel offers some suggestions of how traumatic reactions experienced by a member of the family can affect other members within the family (Evans, McGHugh, Hopwood and Watt, 2003; Westerink and Giarratano, 1999; Dirkwager, Bramsen, and van der Ploeg, 2005; Jordan, Marmar, Fairbank, Schlenger, Kulka, Hough and Weiss, 1992). This can be seen in children of Holocaust survivors (Rowland-Klein, 2004), parents with mental illness (Lombardo and Motta, 2008) or combat veterans (Suozzia and Motta, 2004). Scaturo and Hayman (1992) suggest that this cross-generational trauma can generate conflict within the home through the reactions of traumatic exposure. The conflict is a result of social or cognitive impairments (such as irritability, mood swings, un-warranted aggression) associated with the traumatic reactions which causes conflict within the family, rather than the transmission of the traumatic reaction itself.

McFarlane (1987) has also established that traumatic reactions can cause similar 'disruptions' to the normal family routine in non-firefighter families. This includes: increased conflict, irritability, withdrawal, decreased enjoyment from shared activities and maternal over protection of children within the family unit. Scaturo and Hayman (1992) suggest that, within a marriage, the partner who has not had any direct exposure to a traumatic event assumes the role of therapist. This can also be found in female partners of combat veterans with post-traumatic stress disorder (Manguno-Mire et al., 2007), inferring a relationship between the veteran's symptomology and the spouse's symptomology. The majority of the literature is conducted on male employees and female spouses due to the male-dominated nature of these organisations. Care should be taken when making further inferences as males and females have been documented to use different coping strategies (Hobfoll, Dunahoo, Ben-Porath and Monnier, 1994).

3.18 Conclusion of Traumatic Reactions and family members

In summary, it is suggested that traumatic reactions present within relatives of firefighters are a reaction to the firefighter's traumatic reactions. The explanation of vicarious trauma has been discounted within this context as providing a full, clear account of the phenomena. Whether this is emotional contagion or secondary trauma is to be resolved within this thesis. The literature attending to the relatives of critical occupations has been reviewed in part here, however the most researched and documented of these occupations is the military. This military literature will now be explored to extrapolate understandings and concepts as appropriate to the fire service context.

3.19 Research with families of military personnel

Military families are subject to some differing and distinct occupation-related demands compared with those of firefighter families. However, secondary trauma seen in military family

members has been explored and findings are examined here to inform thinking within the firefighting context.

Scaturo and Hayman (1992) put forward a suggestion which could have overlap with the existing literature on the spouses of firefighters. This was the notion that the spouses of military personnel become a therapist for their personnel. They go on to acknowledge that this could become a complex dynamic if the military personnel needs any formal counselling. The research completed by Scaturo and Hayman include practical application of their findings, suggesting that the role of the military and any support organisations is to assist the family in reacting to challenges of military. Whilst there is no current evidence to suggest that the 'therapist' role is present in spouses of firefighters, the social support literature presented in earlier sections aligns spouses with the role of diffuser for their firefighter. In this thesis a 'diffuser' is a person who a firefighter talks to, rather than completes trained debriefing/processing activities with.

Most of the literature on this issue relates to the military personnel having received a diagnosis of PTSD. The impacts at an individual level have been documented (Orr et al., 1990; Nelson Goff, Crow, Reisbig and Hamilton, 2007) as per the firefighter literature in section 3.11. However research with military personnel is broadening the understanding to see what the perceived impact of those symptomology has on the family dynamics of the diagnosed. Jordan et al., (1992) measured veterans' perceived impact on their family of their PTSD. The research established negative effects on the family dynamics and parenting skills, highlighting that traumatic exposure of a firefighter has an impact on their family.

Renshaw, Rodrigues and Jones (2008) suggest that the spouses of military personnel with PTSD have a higher rate of psychological distress which is related to spousal perceptions of their soldier's distress. They postulate that this is linked not to the spouse's internalisation of the traumatic reactions, but more likely a reaction to the traumatic reactions within their soldier. However, research on the military has also evidenced other impacts on the spouse. Westerink and Giarratano (1999) suggest that spouses of military personnel diagnosed with PTSD have low self-esteem, which is compounded by the lack of intimacy that frequently accompanies a PTSD diagnosis. They also suggest that families of critical occupations are reluctant to seek help even if their military personnel is diagnosed with PTSD, and that behaviour is influencing family dynamics and family life. The notion of influencing family life is reflected in work by Hendrix, Erdmann and Briggs (1998) who used the Systems Theory to explore the symptomology (namely arousal and avoidance) of Vietnam veterans upon their family life. Similarly to Westerink and Giarratano, they suggest that the diagnosis of PTSD compounds isolation felt by the spouses of the diagnosed. Findings support the notion of some kind of transfer of trauma from the diagnosed to the spouse and potentially other family members too. They conclude this transfer to be that of secondary trauma. However, there are other pressures

which are operating within the family. Evans, McHugh, Hopwood and Watt (2003) looked at a subset of veterans with chronic PTSD. Their research suggests that the diagnostic criteria of avoidance caused poor family functioning. The partner of the veteran became motivated to compensate or negotiate within the family in an attempt to negate the impact of the veteran's behaviour. This impacted upon the family dynamics and put the spouse under extra demands.

This evidence so far supports the argument that trauma is no longer an individual experience for the person who is diagnosed; the family are now exposed in some way to those feelings associated with traumatic reactions. This is a notion explicitly stated by Nelson Goff, Crow, Reisbig and Hamilton (2007), although their study did not look specifically at spouses, it explored the perception of relationship satisfaction in deployed soldiers. Within their findings, they suggest that traumatic reactions from combat exposure influence the relationships of those deployed soldiers. The impact on the diagnosed individual, their spouse and their relationship is quite clear. Nelson Goff and Smith (2005), who proposed the Couple Adaptation to Traumatic Stress (CATS) process, have theoretically modelled the changes that occur within a relationship when trauma is experienced. They suggest that the experience of a trauma has an impact on the spouse, who has the potential to develop symptoms of secondary trauma, and that this process is cyclical. This suggests that each individual within the couple could exacerbate both individual's symptoms of trauma. This has an impact on the resources that can influence couple functioning, decreasing the ability for each individual to gain resources from the couple.

This notion of a depletion of resources has been echoed in the wider military literature, but constructed within a different model. The concept of caregiver burden in veterans diagnosed with PTSD has been explored by research (Calhoun, Beckham and Bosworth, 2002; Beckham, Lytle and Feldman, 1996, p. 1068); the latter authors suggest that a diagnosis of chronic PTSD has "a serious negative impact on those around the disturbed individual". This was longitudinal research conducted over two time points; findings suggest that the experience of 'burden' (aligned to literature discussed previously on 'caretaking' of spouse) and psychological distress within the spouse are stable over time. However, this is using a sample of spouses whose partners have a diagnosis of chronic PTSD. The prevalence of this kind of extreme PTSD diagnosis is small within the Fire and Rescue Service personnel within the UK (Regal, Woodwood, Brunsdon and Horsley, 1998). Studies using samples such as these do not explore the impact on spouses whose firefighters/military personnel have traumatic reactions, acute stress disorder, or PTSD symptoms which do not last longer than three months. These are still reactions anchored to a traumatic event, but they are lesser in duration and/or progression of symptomology. The research does not provide an account for those experiences and the impacts upon individuals, couples, family dynamics or family life. Calhoun, Beckham and Bosworth (2002) suggest the presence of a relationship between veterans' PTSD and their spouse's psychological distress, but they suggest that research cannot as yet state the direction of causation between the two phenomena.

Renshaw, Rodrigues and Jones (2008) suggest that the transfer of trauma between individuals within a relationship is not just a straightforward transmission of trauma symptoms. Their findings highlight the importance of the soldiers recognising their symptomology; once that has been acknowledged, their spouse reported decreased levels of distress. This sample did not recruit using the inclusion criteria of a diagnosis of PTSD; most studies have used that criterion which limits the generalisation of findings. They call for further research to explore the mechanisms and cognitions of spouses of individuals diagnosed with traumatic reactions.

Within the military literature, there is a fourth suggestion of trauma transfer between couples, which is limited to just couples within a relationship, emotional contagion (discussed previously in this chapter). The wider concept of crossover has been explored predominantly within the occupational stress literature (see Jones and Fletcher, 1993, for an example). Westman and Etzion (1995) explored the concept within military couples, specifically considering the crossover of job stress burnout. Their findings suggest that burnout could be transferred both ways between couples (previously, research such as Jones and Fletcher, Westman, Vinokur, Hamilton and Roziner (2004) had suggested that it was transferred from males to females but not females to males), and the other individual in the relationship can use the control their partner has within their job as a resource. They suggest that occupational stress and burnout could be transferred as one partner's stress could become an additional stressor for their partner, or they suggest a modelling effect where one partner imitates their burnt out partner. However, they suggest that these findings are limited in some part due to the unique occupation related demands of military work.

The exclusivity of the sample is challenged by the work of Vinokur and Westman (1998). They suggest that their mixed sample of military and non-military spouses can inform how couples (in general) can develop similar symptomology as they are exposed to the same stressors and crossover can occur through social interactions. The sample included the Vietnam veterans, veterans who served elsewhere, and non-military individuals and their spouses.

Crossover within military couples has also been explored with the occupational stress context. Westman, Vinokur, Hamilton and Roziner (2004) suggest crossover is achieved through contagion of emotional reactions. They suggest that one individual's strain acts as a stressor for their partner, but this could be positive as well as negative.

The theory of emotional contagion (crossover) is not the only theory that is prevalent within the military family literature; the notion of secondary trauma is also explored. Figley (1998) suggests this is experienced through the spouse having constant thoughts of their loved one's trauma, the spouse having the desire to help and trying to care for the individual with the traumatic reaction. This could be the most extreme diagnosis (PTSD) or a condition on the scale of

traumatic reactions. The continuous experience of this causes emotional exhaustion and, in turn, leads to secondary traumatic stress disorder for the relative. This differs to the vicarious trauma theory as it is the emotional exhaustion of empathy and caring that initiates the reaction, not the experiencing of traumatic symptomology themselves.

The effects of traumatic reactions on the diagnosed individual and their spouse have been explored thoroughly, but research has missed the opportunity to inform on the effect upon the wider family. Dirkzwager, Bramsen, Ader and van der Ploeg (2005) tried to contribute to this lack of evidence by exploring secondary traumatization in parents (as well as partners) of military personnel. Their findings suggested that the transfer of traumatic reactions does not affect parents. They conclude that this might be due to not living at home with the military personnel, or because the partner of the individual with traumatic reactions is the primary support system and not the parents. However, their findings once again support the notion that exposure to traumatic events has an impact on the individual's spouse. Bramsen, van der Ploeg and Twisk (2002) also provide evidence for secondary traumatic reactions within spouses of individuals exposed to traumatic events within combat. They suggest that individuals exposed to traumatic events display anger, irritability and withdrawal from family life. This causes the partner to take on more responsibility for family life and family dynamics.

Through research conducted on military families, it can demonstrate that the spouses and children are affected by the military personnel's exposure to traumatic events. However, how far this progresses into the wider family system and the wider social support network of the military personnel is currently unclear. The literature indicates that spouses receive a transmission/transfer of traumatic reactions, though the literature is undecided as to how/what that transfer and reaction is. It is also unclear if the children within the family receive this transfer of reactions. The military literature does not draw upon vicarious trauma as an explanation of family reactions; this is in contrast to the firefighter family literature that seems to draw upon this explanation frequently. One aspect that is agreed throughout the military literature is that more research and resources need to be targeted at the families of military personnel and any interventions targeting traumatic reactions need to incorporate the whole family (Dirkzwager, Bramsen, Ader and van der Ploeg, 2005; Calhoun, Beckham and Bosworth, 2002; Backham, Lytle and Feldman, 1996; Evans, McHugh, Hopwood and Watt, 2003; Wexler and McGrath, 1991; Jordan, Marmar, Fairbank, Schlenger, Kulka, Hough and Weiss, 1992; Hendrix, Erdmann and Briggs, 2000; Westerink and Giarratano, 1999). Some of these authors have acknowledged that the military occupation generates unique demands for the family, such as large, sustained periods of separation, combat-related traumatic exposure and constant combat preparedness. Although these demands are not present in the occupation of a firefighter, and therefore not faced by their family, there are some aspects that can inform the understanding of traumatic reactions reported by family members of firefighters, related to their firefighter's trauma as both occupations are exposed to traumatic situations within their roles.

Schumm, Bell and Resnick (2001) propose that organisations should attend and encourage research exploring family dynamics. Their research into military deployment and readiness highlighted the need for a healthy family in soldier's readiness. Findings suggest that an increase in family stress increases vulnerability to battle shock. It is therefore in the interests of the military to ensure that personnel have the necessary resources to reduce family stress as much as possible (e.g. family-friendly policies, official support systems for families when they are on deployment, adequate housing). This call could be extrapolated across to the Fire Service. The research also offers insights into the coping of soldiers, families and units as inter-related systems, which again informs the structure of watches within the Fire Service. This can be both supportive and detrimental for all involved, it is therefore the responsibility of the organisation to ensure that those members have all the resources available to them to ensure well-being and resilience to the occupation impacts. Whilst the Schumm, Bell and Resnick findings suggest the military to ensure a recommended 'number of hours per day' contact for soldiers with their children, most UK firefighters currently have a rotating shift system that facilitates that contact.

3.20 Conclusion of Theoretical Consideration of Traumatic Reactions within the Firefighting Context

In summary, this section has discussed the traumatic reactions of firefighters and the transfer of those reactions to their families. After reviewing the three main explanations of traumatic reactions within relatives of critical occupations, vicarious trauma has been discounted due to the inability to disaggregate the specific route to the relatives and military literature has found it unable to account for the presence of traumatic reactions within military families. Appropriate extrapolation from the literature exploring military families has also informed this discussion. The concepts of peer and family support within firefighter social support and well-being has been discussed with a rationale to understand the reactions of relatives in order to inform the Fire and Rescue Services and the wider community. Having examined the literature surrounding the threat of emotional harm, the next discussion considers the threat of physical harm.

3.21 Risk Perception

As seen in the above literature there are reasons for family members to become concerned for the emotional health of their firefighter; mostly this originates from the potential or actual physical harm to the firefighter. This perception of physical harm is reported within the literature and represented within the critical occupation literature. Jackson and Maslach (1982) suggest that families often have an unrealistic perception of risk and the duties involved in police work due to preconceptions and media interpretation. However there are few dramas on UK television set within the Fire Service, despite long running programmes based on the Police and Ambulance Service/Accident and Emergency. Some research has investigated the firefighter's perception of their safety (Fullerton, Ursano, Reeves, Shigemura and Greiger, 2006) following a

major incident (events in New York on September 11th 2001). This work established a relationship between post-traumatic stress disorder, depression and perceived safety. Although providing an insight into the relationship of perceived safety within firefighters, this does not provide an insight into the perception of safety by the family of firefighters.

Perception of safety can be considered as the family's perception of physical risk to their firefighter. By taking into account both occupational and social factors (Mearns, Rundmo, Gordon and Fleming, 2004), relatives' perception of risk can be understood as well as measured. The risk literature is filled with theories and concepts representing risk and how individuals understand risk. However, these theories do not conceptually map onto the experience of families of firefighters directly.

In order to establish which aspects of the risk literature this thesis deems relevant, it is necessary to establish the parameters of which aspects of risk are not relevant to this study. When risk is discussed in this thesis, it is not referring to comparative optimism in its truest form, as the risk estimates cannot be drawn from the base rate (Brown and Morley, 2007; Chambers and Windschitl, 2004; Milhabet and Verhac, 2011; Moore, 2007). It is not risk messages, heuristics, biases or base rate statistics (Joffe, 2003; Klein, 2003; Martin, Bender and Raish, 2007; Slovic, Finucane, Peters and MacGregor, 2004). All these approaches draw estimates by an individual comparing their risk against that of the general population. Members of the general population do not complete firefighting activities and therefore this cognitive resource is not available and cannot be used by family members. The approach that this study has taken is not the realist or "foundationalism" approach (Sayer, 2000), nor has it taken the social constructivist approach.

The position of risk which this study is taking is a "co-constructionist or (critical) realist approach...which presupposes a non-social world as well as the conditionality of all knowledge forms" (Vandermoere, 2008; 388). Otway and Thomas (1982) suggest that "risk is a social construct, with emphasis on the contrasting definitions about the risks in social reality". This means that the approach acknowledges concepts such as absolute risk, but also that individuals interpret these risks in different ways. The position within these discussions of the concept of risk itself is sympathetic to that described by Henwood, Pidgeon, Sarre, Simmons and Smith (2008) where they critique some risk research as working to a definition which is an "overly cognitive and rationalistic account of human preferences and behaviour, and their interrelationship with social norms" (p. 423). They instead suggest that "a person's biographical background and the contexts in which their everyday lives are lived out are important factors that may shape their subjective 'risk perceptions'; that is, their relationship to sources of risk, their perception of risk and the strategies that may or may not be available to them for coping with risk" (p. 423). It is these aspects of perception and resources to process risk that are highly relevant to this research.

This literature review has identified concepts and theories within the wider risk literature which conceptually map on to this construction of risk. That is, the relatives' understanding of risk of physical harm (or physical danger as defined by McLain, 1995) to their firefighter. Within most of the risk literature, the focus has been directed on an individual's perception of risk to themselves. However, the focus of this study is the relatives' perception of risk to the firefighter. There are studies that have widened the focus, using perceived risks of disease between self and family and friends (Wilson, Arvai and Arkes, 2008; Hunter, 2006). Research in this area has observed differences in the way in which risks are appraised for different constituent groups surrounding an individual. Montgomery, Erblich, DiLorenzo and Boubjerg (2003) suggest that when a threat is posed to a non-blood relative, the objective risk is increased. This suggests that threats to oneself and close family are more prominent.

The threat to non-relative others increases due to the optimistic bias within the risk theory, this suggests that risk estimates are lower for the individual or their close family when compared with the base rate. The base rate is the (over)estimation of the risk happening to other people within the general public whom the individual does not know, and the underestimation of that risk happening to themselves or their close relative. For example, Klein and Weinstein (1996, p.27) suggest that people are "unrealistically optimistic. That is, they believe they are less at risk for experiencing a variety of negative life events than others are". The comparison between self and others is not a concern of this study directly, as this study is interested in the physical or emotional risk perception of relatives of a specific occupation, firefighting.

Comparative statistics could inform this thesis, drawing upon methods in the area could aid in identifying relatives' perceived sources and levels of risk to their firefighter. There are studies (Lindell and Nam Nwang, 2008; Sjoberg, 2000) that draw comparisons between self to friends and family or self to peers, mostly concluding that individuals overestimate other people's risk. However, these judgements do not always include the assessment of risk happening to close family; suggesting that close family could be assumed in to the grouping of the general public. They have achieved differentiation between their assessment of risk to self, compared to (or separate from) the general public and close family and friends. Comparative risk can further inform this study in other ways. Flin, Mearns, Gordon and Fleming (1996) used comparative risk theory to inform their research regarding the risk estimates for oil platform workers. Measures asked participants to rate how safe their occupation was compared to eight other occupations or activities that have been rated in other sources as high risk. So using the methodology of selecting appropriate comparison groups could use comparative risk. Research by Sjoberg (2000) has supported the segregation of these different groupings and goes further to highlight an individual's assumption that they have less chance of a risk event happening than most members of the general 'lay' public (this term is debated later in this section). He terms this 'risk denial'. He links risk denial to a sense of control over the risk.

Greening and Chandler (1997) suggest that the perception of risk is higher if another person is in control of the environment. The relatives have little or no control over the environment within which their loved one operates at work. Second, as the firefighter's work is mostly performed as a team (which the relatives are aware of), their firefighter has partial control over some aspects of the tasks performed within their daily role (as they are being completed by other firefighters in their team). This leaves the relative with the knowledge their firefighter does not have full control over their work tasks and therefore the assumption would be that the perception of risk is higher as a result. Therefore, the relative is forced to trust in the co-workers of their firefighter, the watch, as is the firefighter.

Trust in co-workers, in conjunction with perceptions of control, have been tested previously (Leiter, Zanaletti and Argentero, 2009; Slovic, Fischhoff and Lichtenstein, 1984); however, as with most of the studies examining risk, the focus is on the employee's perception of trust in their own co-workers. This concept could expand in line with phenomenology, in order to be relevant to the relatives. Although on initial inspection this sounds precarious, phenomenological psychology is built on the concept of someone making sense of someone else's interpretations. Flin, Mearns, Gordon and Fleming (1996) measure trust in others' concern for safety on an oil platform. Their definition of others included managers, safety representatives and fellow workers. The FRS operates differently to oil platforms and therefore the definition of co-workers will be limited to the watch and their immediate managers. This is for two reasons: first, they are the people in attendance on the fireground and so they are the people carrying out the tasks with the firefighters. Second, as previously discussed, the findings from Regehr et al. (2005) and Kirschmann (2004) confirms that the watch members are at the core of the 'FRS Family' that the relatives defined in their talk.

McLain (1995) takes this further and suggests future risk research should focus on information from co-workers or "other social sources" (p.g.1739) to see how they influence risk attitudes. This same principle can be applied to relatives; if the relatives of firefighters are getting their information from their firefighting relative, other relatives of firefighters and possibly the wider society, then this will influence their perception of risk. This should be considered in light of previous discussions where Jermier, Gaines and McIntosh (1989) suggest firefighters manipulate their own, and others' constructions of the risks involved in their occupation for gratification, prestige and status.

The question which arises from Klein (2003) is: are relatives of firefighters laypersons or not? They are not experts, as they do not know the specific details of firefighting and the risks involved in the disparate activities of an operational firefighter. Vandermoere (2008) suggest that contact with an expert on risk (such as a firefighter) can increase the awareness and concern, but not the education of a risk' leaving the relatives with concern but limited knowledge

to moderate that concern. Therefore this study assumes that the families of firefighters do not know the content and remit of that job well enough to be called experts, however it is still not fitting to label them as laypersons. This is relevant as familiar risks are seen as having favourable estimates and unfamiliar risks are seen as having unfavourable estimates (Alicke et al., 1995) where favourable is aligned to positive outcomes for the individual and unfavourable is aligned to negative outcomes for the individual. This is important because laypeople assess risk in a more holistic manner, experts analyse it in a more analytical step-by-step procedure (Wogalter, Brems and Martin, 1993). If the relatives of firefighters were to be considered laypersons within this context of risk perception, then their perception of their firefighter's job could be considered more favourable than police work.

Fischhoff, Slovic, Lichtenstein, Read and Combs (1978) developed the psychometric paradigm of risk. From this, it can be suggested that in 1978 laypersons viewed police work as having more uncontrollable, poorly known and delayed consequences to the work. Firefighting was seen as having slightly more immediate, voluntary, known and controllable consequences. However, of the two professions, firefighting was seen to be more likely to be fatal, catastrophic and 'dreaded'. This paradigm has been replicated (Breakwell, 2007; Slovic, 2000). Findings suggest that firefighting was seen to be more immediate, known and controllable and police work was seen to be more uncontrollable, with increased risk and fatal probabilities. Therefore, although the detail may not be clear, firefighting risks are more understood by laypersons and less dreaded than police work.

This public perception of police work might be influenced by the combination of their authority and the perception of their work as dangerous (Henry, 1995). He suggests that this actually serves to ostracise Police Officers from their civilian friends and family. However, the danger combined with authority would not apply to firefighters as they do not have the responsibility to implement law and order as a Police Officer does. This highlights another issue with extrapolating research on police officers and their families to firefighters and their families.

3.22 Coping with risk

When coping with risk, the process starts with an appraisal of the risk, which relatives would do of the tasks and activities within their firefighter's role. Cox and Tait (1991) refer to the risk's capacity to harm and the estimation of the probability of incurring harm. Leiter and Cox (1992) propose a three factor model for appraising occupational risk. The three factors are: lethality, prevalence and control, which are then linked in turn to the model of appraising threats by Lazarus and Folkman (1984). Leiter, Zanaletti and Argentero (2009) support the notion that risks are appraised. They suggest (through previous literature) that the risk is perceived, and then the potential consequences and the individual's control over the potential risk are considered. When trying to cope with the threat of risk, families of firefighters often trust in their firefighter's skill set. However an error such as overestimating skill leads to underestimating risk

(Greening and Chandler, 1997) which leaves the relative vulnerable to experiencing that risk without being prepared for its likelihood.

Once the relative has assessed the risk (and all its constituent parts), the next process identified within the literature is to cope with that risk appraisal. Martin, Bender and Raish (2007, p.888) draw on the protection motivation theory within the health behaviour literature to suggest that the individual makes an “assessment of threats (severity, vulnerability, and benefits) and coping factors (self-efficacy, response efficacy, and costs) combine to form a motivation in individuals to protect themselves from the risk”. Slovic (2004, pg.316) if a rational system is operating (analytical system which functions by established rules of logic and evidence) with and alongside/interacting with the experiential system which encodes reality in images, metaphors and narratives to which affective feelings have become attached.

The literature developed from risk perception and safety offers some understanding of the differing aspects of safety concerns of both employers and employees. Part of the measure of objective risk is the occurrence of a hazardous event, such as an accident occurring on the way to a call-out for a firefighter. Rundmo (1996) argues that this probability measure should also contain a measure of certain or likely consequences. This is because an event could have only a slight probability of occurring, but if it did, it would have extensive consequences. These differences in evaluating a hazardous event should be considered in the measurement of relatives' understanding of risk.

However, Loewenstein et al. (2001) suggest that individuals are scared of the possibility of a risk event happening, rather than the probability that the risk event will happen. Hsee (2001) suggests that the potential outcome of a gamble is emotionally powerful, that is, if the potential outcome (such as extensive injuries to their firefighter) is emotionally charged, then the un/attractiveness of that risk event is relatively insensitive to changes in probability. This suggests that regardless of the objective risk, relatives will acknowledge the physical risks associated with their firefighter's job according to what the potential emotional outcomes might be (injury to health or well-being). This is regardless of the probability of the nature or type of event occurring. For example, there are environmental factors increasing or decreasing the probability of incidents occurring to which their firefighter will respond to, and possibly be physically harmed by. These include spring flooding or summer wildfires, which influence the probability of injury to their firefighter. However the emotional nature of their firefighter sustaining injury is emotional regardless of the nature or type of incident, and therefore these changes in probability of incidents will not be considered in the risk perception of the relative.

Slovic (1987) suggests that small risks are overestimated and large risks are under estimated. This does not outline what a 'small risk' and a 'large risk' are however. It could mean the type or frequency of the event. This is pertinent as a small-scale risk in probability of occurrence might

have potentially fatal consequences. This implies that families of firefighters would view the risk estimates according to type or probability of the event/incident taking place. These kind of judgements of possible outcomes can also be influenced by their assessment of risk in other ways. Sjoberg (2000) suggested "risk perception is to a large extent a question of ideology in a very specific sense, not in a general sense...this is a specific case of a general principle that people tend to see mostly good properties of those concepts or objects that they like and mostly bad properties in those they dislike" (p. 9). This is a complex concept to apply to relatives of firefighters due to the idiographic nature of the assessments. From the studies by Regehr et al. (2005) and Kirschman (2004) it can be assumed that on balance relatives take pride in the function and resulting outcome of successful firefighting, but do not like to consider the potential outcomes of the risks involved with the occupation mirroring the quote from Sjoberg. How their comfort and discomfort when considering these aspects direct their perception of risk is yet to be detailed in the literature.

One aspect of living with, and therefore appraising, these risks each time their firefighter is at work is "that an 'at risk' population grows accustomed to the hazard and then downplays the risk" (Davis, Ricci and Mitchell, 2005, p. 2-3); this is termed the normalisation bias. Mileti and O'Brien (1992) discuss this concept in their paper exploring communicated risk in disaster situations, namely the earthquake in San Francisco in 1989 where aftershocks were felt for up to two months afterwards. They considered the reactions of members of the public within the context of their experience and knowledge to the warnings for these aftershocks. Findings suggested that for those individuals who had not suffered damage or inconvenience in the earthquake or previous aftershocks, they held the assumption that future aftershocks would not damage their property or inconvenience them in any way. They concluded that normalisation bias is more common amongst those with less experience of the risk, and therefore a lower risk perception. They infer the lower the risk perception, the less likely an individual is to try and neutralise that risk. Relating this to relatives of firefighters, they are experienced in the risks within their firefighter's work and become increasingly more experienced over time.

However, research has previously countered this perspective, Fitzpatrick (1980) has suggested that it is that continuous exposure to risks which either sharpens or dismisses risk perception. Conducted on another critical occupation (coal mining), his work suggests that a workplace with constant high risk activities and hazardous work environments and threats (such as a tunnel collapse) might encourage individuals into adapting to those dangers. His work suggests that this response allows the individual employee to cope with the constant threat of danger or harm. He defines firefighting within this type of working environment (p. 131). His work deals with concepts such as fatalism, fear management and an approach to danger as a long-standing companion. He suggests that employees within these cultures develop a common approach, working practices and traditions to enable them to cope with their working environment.

Although informative and directly relevant according to Fitzpatrick himself, this environment does not necessarily transfer in to firefighting work. The reason being that when considering the work of a miner, whenever they are at work they are underground for the predominant amount of time, with large, powerful, machinery and explosives. This is work in the dark in constant near proximity to those tools of their trade. Comparing that to firefighting, firefighters only spend, on average, five percent of their time attending fires or road traffic collisions. The rest of the time they are maintaining their equipment, compiling paperwork, training, or completing preventative work with the local community. They are not constantly in a burning building, climbing up a ladder or cutting people out of car collisions. Therefore firefighters are not within that environment. However, like miners, when they are in those situations, extricating casualties or attempting to limit economic or social damage, their working environment is at times unpredictable, but largely more predictable than the layperson would consider. This balance of risk-associated and non-risk associated tasks should influence the perception of physical harm which relatives hold. However, this would be predicated on the relatives being knowledgeable and educated about their firefighter's role and likely daily activities.

This conceptual understanding of balancing knowledge of risk with frequency of risk has been supported in the study of Cullen, Link, Travis and Lemming (1983). Their study concerned risk perception amongst police officers. Their findings suggest that although officers' personal beliefs are that they have a very low probability of becoming injured at work, they still maintain to others that their work is dangerous. They go on to postulate that this might be because police officers have to regularly consider the possibility of physical injury, but that they are aware at some level that the probability of them actually becoming injured is not that likely. This concept of having to consider the possibility of injury, but also be acquainted with the low probability of sustaining injury may also be present in relatives of personnel in critical occupations.

Although being informative regarding their firefighter's coping mechanisms, this does not directly inform how the relatives cope with the risk involved in their loved one's work. To understand these further, aspects such as trust, training and co-workers will need to be considered. Trust in co-workers is a well-established phenomenon in the critical occupation literature (see Hill and Brunsden, 2009). Trust in co-workers within these occupations is sometimes at the exclusion of family and friends (Henry, 1995). This could possibly serve as reassuring to the relatives of those personnel, but it might also mean they are excluded from occupational information from their loved one which would otherwise positively influence their perception of the risk involved in their firefighter's job. For example, they might not learn about the repetitive training (as discussed in chapter one) and therefore this might prevent the relatives from being able to draw on that to manage their risk perception.

There is a lot of importance placed on trust, training and co-workers as suggested by Turner and Gray (2009) in their special issue of the journal *Human Relations*, which considered the

social construction of safety. Within this special issue, is the work of Barton and Sutcliffe (2009) who postulate that occupational safety is guided, in part, by the individuals and groups which enact it. These individuals operate within the organisation's structure and explicit direction to develop a safety culture. When the culture or context is ignored, it can lead to devastating consequences as illustrated by Chikudate (2009). It is therefore evident that the safety culture existing within the Fire and Rescue Service and how it is understood and operationalised by firefighters is pertinent to the experience of the relatives. Their perception of how prominent safety is attended to within the organisation and the organisation's commitment to maintaining the safety of firefighters is likely to be the most influential facet within their perception of risk. Alongside the Barton and Sutcliffe work, an organisational culture of safety is explored by Bloor (2002). He used the mines in South Wales to explore how groups of miners collectively acted to reduce the hazards and increase safety in the mines. The issues involved in this concept of safety culture and employees' ability to increase safety will now be explored in more detail.

3.23 Perception of Occupational Risk/Safety

This area is a sub component of risk perception; it draws from occupational risk, probability rates, objective and subjective hazards, perceived danger and perceived harm. This informs the participant's perception of physical and emotional risk of harm. Jermier, Gaines and McIntosh (1989) draw on a sample of 'beat' police officers, police officers in an investigative role and support staff, to explore their perception of the risk of physical harm. Although firefighters have different occupational demands, the principles within this can be extrapolated across. Using psychometrics they formulated the different risks and perceived risks involved in the three roles within the police service.

However, the police service and society/culture has undergone significant change since 1989. The definitions and concepts of risk that this draws on have since been developed and shaped from this embryonic understanding. They define a dangerous setting as having three qualifying characteristics: inherent physical or emotional danger, objective by nature (existing outside of the perceiver) and subjective (perceived) risk, and the potential for accidental (sudden) and incremental (delayed) harm. This can all be seen within the data from the relatives of firefighters in previous published literature (see earlier in this chapter). The Jermier et al. (1989) paper draws on occupational risk (estimates of objective danger informed by injury data) and combined this with the perceived danger measures to produce occupational risk estimates. However, they do suggest that when workers are constructing their perceptions of risk, they can underestimate the risk in order to facilitate a "denial-coping syndrome" (p.17).

The other highly pertinent concept they refer to is the notion that firefighters and police officers manipulate the public (and their own) construction of their role and occupational demands in order for it to appear more risk laden. This is for purposes of gratification, prestige and high status. From this study there is a strong argument to include measures which identify physical

and emotional dangers, and also to include measures of perceived physical danger's as defined by participants (as opposed to objectively ranked measures by indicators). The family situation of the perceiver is also to be considered; Johnson's (2004) work on risk comparisons suggest that being a parent had an effect on the perception of risk estimate. This suggests that firefighters and their spouses with children perceive risks with more sensitivity due to the desires to protect and decrease the vulnerability of their children. There is mixed research regarding further individual differences within risk perception. For example Smith (2008) suggest that dispositional optimism has an effect on how individuals perceive risk. Barnett and Breakwell (2001) suggest a hazard personality profile. Breakwell (2007) provides a comprehensive list detailing factors which influence risk taking, but not personality factors which influence risk perception. Indeed, having reviewed the literature exploring personality constructs and risk perception, she concludes that there is no link.

There are also other factors which come into play when coping with risk from a male-dominated environment. Research carried out by Sjoberg (2003) established a negative relation between risk mitigation and a macho attitude, such that, as the macho attitude increased, the demand for risk mitigation decreased. Researchers have established that the culture of the UK Fire and Rescue Service is male-dominated and frequently presents a macho attitude (Hill and Brunsden, 2009; Wright, 2008, Redman and Snape, 2006). Research suggests (Henry, 1995) that this macho attitude is not diluted by the introduction of female colleagues, as the female colleagues enter in to this behaviour as well. This is reflected in research on other male dominated critical occupations (Finnegan, Finnegan, McGee, Srinivasan and Simpson, 2010; Cawkill, 2004). With this negative relationship between macho attitude and risk mitigation in mind, it offers a possible 'downplaying' of risk information by the firefighter to their relatives. As a consequence, the relatives might have a filtered or diluted perception of the risk contained within their firefighter's role.

When trying to establish occupational safety and risk perceptions, the risk measure needs to be tied to the situation in which the individual encounters that risk (Rundmo, 1996). The risks cannot be anchored to something outside of the individual's experience of that risk. Therefore the risk measures used by this thesis are tied to the relative's perspective (as outlined before) and are also tied to the occupation of firefighting. Administering a generic measure of risk, or one which is tied to the oil platform occupations would not suffice as would have confused participants, and would not tap in to their assessment of firefighting occupational safety and risk. Specifying the 'target risk' in this way is also supported by Sjoberg (2000).

When reviewing the debates in the literature and the opportunities presented to measure risk, measures of absolute, objective, physical, emotional, occurrence and occupational risk, perception of risk, trust in co-workers and safety, are all offered through the occupational risk and safety literature. Particularly from offshore petroleum platforms (e.g. Rundmo, 1992a;

1992b; and the body of work produced by Flinn et al. over the years), risk perception in aviation (e.g. Hunter, 2006), threat from natural disasters (e.g. Martin, Bender and Raish, 2007; Lindell and Nam Hwang, 2008; Davis, Ricci and Mitchell, 2005; Sjoberg, 2000; Vandermoere, 2008), trust in the employer and co-workers in high-risk occupations (Conchie and Burns, 2008; Leiter, Zanaletti and Argentero, 2009) and other more generic papers on occupational safety risk (e.g. McLain, 1995; Leiter, 2009; Mills, Reyna and Estrada, 2008; Wilson, Arvai and Arkes, 2008). The move from conceptualising this risk to operationally measuring risk will be considered further in chapter 6, section 6.4.

Trust in occupational safety, in response to an emergency, accident or error, is a way of managing the relatives' perception of risk. This is the belief that the organisation will protect their firefighter as best it can from potential risks, react appropriately if those risks are met, and deal with the consequences appropriately and with the best interests of the people involved in mind. This trust in an organisation is distinct from public trust (trust in society and its leadership) and specific trust (anchored to a group of people dealing with a single event in a moment in time) as defined by Breakwell (2007). Trust in an organisation is affected by how it has reacted and dealt with situations previously. This trust is different to that of the trust in the co-workers outlined previously in this chapter.

The notion that relatives seek assurance from training so firefighters have experiences, knowledge and procedures to successfully deal with risks contained in their job is evidenced by research. Duffy (2003) explored training in the machining industry. His findings suggest that training allows "better recognition of hazard and risk in unusual circumstances" (p. 114). Suggesting the relatives perceive training as reducing the absolute risk and hazard.

When considering the consequences of the firefighting occupation, it should be considered that most relatives might not think about the physical or emotional risks on a daily basis. As with most households, routine and other life demands relating to their own employment, the running of the household etc occupy the attention of relatives. This is supported by Henwood, Pidgeon, Sarre, Simmons and Smith (2008) who suggest that "participants routinely live their lives with no reference to risk at all" (p. 435). However, previous literature focussing on critical occupations, and specifically the firefighting occupation, has highlighted this as a pivotal focus for relatives, providing the rationale for the inclusion in this review of relevant literature.

3.24 Conclusion of Theoretical Consideration of Risk Perception

In summary, this chapter has reviewed the literature relating to relatives' perception of risk of physical harm to their firefighter. The process and factors to appraise risk have been reviewed and consequently it is evident that processing risk is aligned to occupational safety, knowledge of the role and trust in the co-workers of their firefighter. Having explored the literature, the

possible resources to buffer these impacts will be explored in more depth; namely resilience and well-being.

3.25 Resilience

Research about resilience published in relation to the firefighting occupation has traditionally been focussed upon resilience engineering, resilience of organisations, safety systems and policies. They place resilience within the domain of risk and safety management (Hollnagel, Woods and Leveson, 2006). It is important to highlight that this thesis does not focus on the resilience of systems, processes and organisations to mitigate risks. The term resilience within this thesis represents the concept of one's ability to achieve positive outcomes in the face of adversity, the component parts of this conceptualisation have been discussed in detail by Kolar (2011). She outlines the four waves or areas of focus which the research literature established to develop the knowledge base of resilience.

The first wave of research identified protective factors, the second identified mechanisms which facilitate those predictive factors. Kolar details the disagreement between different ideologies of the third and fourth wave. The third wave focussed upon establishing the internal and external resources that facilitate resilience and the fourth wave focusses upon how the resources facilitating resilience across levels (from individual to societal) integrate. Vaishnavi, Connor and Davidson (2007) echo this approach of levels of resilience in their suggestions for effective interventions to increase resilience. These interventions are grouped at the levels of cognitive (individual), family (home and parenting practices) and society/culture (community resources) providing further support for conceptualising resilience in the fourth wave which Kolar proposed. This is in contrast to the traditional approaches of literature published in wave one and two where resilience was conceptualised as an internal and individual asset. Recognising the integration of the individual within other levels allows a richer and more valid study of resilience within families of firefighters. This is the approach that this thesis has taken.

Therefore, the debate between process or outcome orientated operationalisation of resilience will now be considered. This thesis takes a multi-level integrated approach to resilience positioned within a process-orientated approach to resilience (Kolar, 2011). This aligns with Kolar's position of "focussing on interactive and variable nature of risk and protective factors, which themselves range from micro (individual) to meso (societal) levels, a process-based understanding facilitates the evaluation of resilience as a shared responsibility between individuals, their families, and the formal social system rather than as an individual burden" (p. 425). Within this conceptualisation of resilience, Kolar (2011) highlights the mistake of conceptualising risks and protective factors as the positive and negative expressions of one construct, she provides a review of the literature supporting them as two different constructs. These will now be reviewed in more detail.

Smith, Dalen, Wiggins, Tooley, Christopher and Bernard (2008) explored protective factors such as optimism, social support, active coping. Family resources for protecting against risks are suggested to include: “commitment, communication, cohesion, adaptability, spirituality, connectedness, time together and efficacy” (Silliman, 1994, as cited in Boss and Mulligan, 2003). Risks which are evidenced to impact on resilience include; ill-health (Biesecker et al., 2013), family disruption and isolation (Gilgun, 2004), economic downturns and catastrophic events (Everson and Camp, 2011). Although not an exhaustive list, two of these risks (family disruption and catastrophic events) are associated with the literature surrounding relatives of firefighters as discussed previously in this chapter.

Resilience available specifically through the family structure has been identified and discussed within the wider resilience literature (Regehr and Bober, 2005; Hawley and DeHaan, 2003; Everson and Figley, 2011, Patterson, 2002). In these discussions, the personal and communal resources shared by the family (Regehr and Bober, 2005, pp.129) are evidenced. However, the formalised descriptions of family resilience as a phenomenon of itself, rather than an extension of the individual resilience literature have limited applications within certain methodologies. For example, if the researcher is only able to gather one family member’s perspective, then a comprehensive documentation of the family resilience cannot be completed. This is a challenge for all research involving families. Alternative models such as the Resiliency Model of Family Stress, Adjustment, and Adaptation have been suggested but direct application of such models is limited and has been heavily critiqued. These critiques are summarised by Hawley and DeHaan (1996). They highlight the absence of the individual resilience of the family members, and the lack of cognisance of time and developmental processes within this model.

This thesis sought to characterise “the protective factors that contribute to families being resilient” (Patterson, 2002, p.349), rather than conceptualising resilience as a process, an outcome or a tool to define risks. It should also be noted that resilience literature frequently associates personal growth as an individual protective factor (Burns, Anstey, and Windsor, 2011; Burtona, Pakenhamb, and Brown, 2010). In order to appropriately explore the risks and protective factors associated with the impacts of the firefighting occupation on relatives, this thesis will include personal growth as a separate factor defined by Ryff (1993).

3.26 Well-being

Resilience has been widely defined as sitting within a wider context of well-being (Burns, Anstey and Windsor, 2011). Ryff’s work includes a theoretical framework and measure of well-being (Ryff and Keyes, 1995). This six factor model (see table 3.19.1) argues for a move to well-being rather than measures of feeling happy and satisfied. She argues that simply measuring these states negates the longer-term developmental, clinical and mental health facets of well-being such as personal growth, mastery and self-acceptance (Ryff, 1995).

Table 3.19.1 Aspects of well-being conceptualised by Ryff

Self-acceptance	Positive relations with other people	Autonomy
Environmental mastery	Purpose in life	Personal growth

She argues that previous well-being literature was not cognisant of environmental influences such as culture, biological aspects, age or sex (Ryff, 1989). This conceptual framework suggests well-being is not simply a set of positive and negative factors which exist on a continuum, but that they are separate dimensions (Ryff, 1989). However, evidence has established a close association between those separate constructs, as well as evidence contesting Ryff's assertion regarding age (Burns, Anstey and Windsor, 2011). Findings have inferred that the measure developed within this framework does not measure some subjective well-being constructs nor does it consistently load on to six factors (Kafka and Kozma, 2002; Ryff and Keyes, 1995). Based upon these measurement issues, this holistic framework of well-being by Ryff was rejected, but the consistently performing factor of personal growth was retained (see discussion in the previous section of this chapter).

Turning to other models of well-being to provide a theoretical framework, the literature predominantly divides in to two constructs; subjective well-being and psychological well-being. Subjective well-being is concerned with the individual's short-term, subjective view of their psychological state and satisfaction; namely an increase in positive emotions and reduced or no negative emotions (Vitterso, 2001). In contrast, psychological well-being plots an individual's long-term development of the resources and characteristics which enable their achievement of those outcomes. In summary, subjective well-being is the perceived outcome of being emotionally buoyant and psychological well-being is how this outcome is achieved through meaning, growth and construction (Wood, Joseph and Maltby, 2009; Burns, Anstey and Windsor, 2011).

Given the relevance of the positive resource well-being could offer to relatives of firefighters, this thesis is inclusive of this construct. Wood, Joseph and Maltby (2009) argue that psychological well-being may develop differently within individuals dependent on their environment and the wider context. So this wider context should be taken in to account. Taggart, Friede, Weich, Clarke, Johnson and Stewart-Brown (2013) suggest that the above conceptualisation of well-being is shared between Europe and the USA. Fredrickson's (2003) Broaden and Build theory takes account of this. The theory posits that individuals who seek out positive meaning and long-term benefit within daily experiences accumulated more resources, more resilience and more positive experiences, resulting in an "upward spiral of continued

growth and thriving” (pp.335) for the individual, increasing resilience (Burns, Anstey and Windsor, 2011). The theory draws from evolutionary, cognitive, biological and social psychological phenomena to support the theory, but has limited theoretical underpinning and focusses exclusively on positive experiences (Fredrickson, 2004), neglecting negative emotions from the framework. This theory is regularly positioned within positive approaches to psychology, but by neglecting negative emotions from the framework, it does not offer an explanation (only an implication) as to how negative meaning within daily experiences accumulate less resources, less resilience and more negative experiences.

This thesis has adapted an inclusive approach; detailing the resources and concepts of resilience and well-being, and acknowledging the arguments to contextualise these within the culture and social structures. The thesis has therefore used Conservation of Resource theory to act as an overarching conceptual framework which will now be discussed.

3.27 Conservation of Resource Theory

In order to explore the occupational consequences of firefighting on relatives, individual impacts need to be considered in their context, culture and group dynamics (Brunsdon, Hill and Maguire, 2012). To achieve this, this thesis will use the conservation of resource theory as a framework.

Conservation of Resource (COR) theory was initially developed by Hobfoll (1988). The original theory was suggested as a more credible alternative explanation for stress than that offered by the appraisal model (Lazarus and Folkman, 1984). Hobfoll argued that resources used to protect an individual from a stressor could be studied in isolation, but that unless all resources that could be used to cope are considered, coping could not be fully researched and neither could stress. This limited approach has also been critiqued by Fredrickson (2004) and Ryff (1998) in relation to the exclusion of positive emotional stimuli. Through his publications (Hobfoll 1988; 2001; 2002; 2010; 2012) and publications with colleagues (Hobfoll et al., 1988a; 1989; 1990; 1993; 1999) the theory has been developed and refined. Monnier, Cameron, Hobfoll, and Gribble (2002) have previously applied COR theory to the Fire and Rescue Service context and Wayne, Grzywacz, Carlson and Kacmar (2007) have used the theory to explore the family-work interface.

Although originally developed as a theory to explain stress, its potential to explain adaptation was soon recognised. The main critique of the stress appraisal model (Lazarus and Folkman, 1984) from COR theory was the inability for the appraisal model to allow for an individual to learn, adapt and grow in their responses to potential stressors. This does not provide an opportunity for the individual to alter future behaviour to facilitate coping, or to build their resilience for future threats. Hobfoll’s theory focussed on situating resources within a pool. The theory considered coping within a context, rather than simply the individual. COR theory also acknowledges the ability for individuals to gain, preserve and build resources for any potential

threat. The theory infers it is the loss of these resources which has a detrimental effect on the well-being of individuals.

COR theory attempts to offer insights and integrate biological and social explanations of behaviour. Considering the range of resources an individual has, and how they are situated within a more general context, enables COR to offer a motivational explanation of human coping behaviour. Despite research suggesting that adaptation to events does not lead to permanent change over time (Diener, 2013), COR theory posits that it is the accumulation and protection of these resources which leads to successful coping, rather than change within the individual.

The premise of the theory assumes people attempt to gain, preserve and build resources within different structural tiers (Halbesleben, Neveu, Paustian-Underdahl and Westman, 2014). Within structures at individual, family, group, community and cultural tiers are different resources available to any one person. Examples of these can be seen in table 3.27.1 where examples of the five types of resources are listed (adapted from Wayne, Grzywacz, Carlson and Kacmar, 2007). A more comprehensive list of COR resources is detailed on p. 342 of Hobfoll (2001). It is the continued access to these wide ranging resources that individuals are motivated to protect. The loss of resources (or access to them) is what jeopardises the well-being of individuals.

Table 3.27.1: The Five Types of Resources

Personal Characteristics	Objects	Energy	Conditions	Support
Self-Esteem	Home	Time	Marriage	Loyalty
Self-Efficacy	Food	Knowledge	Employment	Intimacy
Optimism	Clothes	Money	Seniority	Companionship

Resources are defined as things within the environment of an individual or group which they can draw upon to manage stress and increase their resilience to negative emotions and cognitions. The theory suggests there are some universally valued resources which groups or cultures try to protect: health, peace, self-preservation, well-being, family and a positive sense of self (Hobfoll, 2012).

The resources are not isolated from each other, but are referred to as ‘pools’ at the individual level and ‘reservoirs’ at the group level. The tiers of people within the dynamic mean that these resources are collective and flow between the tiers. Hobfoll (2001) suggests that the resources, and COR theory, integrate “the individual-nested in family-nested in tribe” (p. 338). He goes on to define these terms, but, for this programme of research, the individual will be the relative of the firefighter, as they are the focus of the research. The family will be either the kin family of

the relative or the fictive family of immediate fire community members (such as the tight co-worker network) as the family tier can either be “kith or kin” (Hobfoll, 1989, p. 517). The tribe will be the Fire and Rescue Service, the rationale for which will be explored later within this section. This will include the different tiers of structures and resource pools available to the family members of firefighters.

As the tiers of people within this system identify threats to their well-being or resilience, the theory speculates that they will change and select their resources with the demands to ensure maximum fit. Therefore ensuring the threat is managed and their resilience to negative emotions and cognitions is maintained. Through resource replacement or resource substitution the collective reservoir/pool does not deplete. If this were to happen, the impact and resulting effect could be exponential and develop into a resource spiral (Hobfoll, 2011). The resource divide between the resource rich and the resource impoverished, and the resulting likelihood of resource gain is well documented (see Hobfoll, Freedy, Lane and Geller, 1990).

The theory advocates that resources do not appear (and should not be tested) in isolation from one another, but that they appear in clusters which usually present together. This means that when researchers study resources in isolation it should be acknowledged that a cluster of resources are most likely providing the protective influence. When researchers select one resource to study, it brings questions to the relevance and completeness of their findings. Major resources, such as the personal characteristic of self-esteem, are synonymous with associated resources such as optimism. This clustering phenomenon is termed ‘resource caravans’ by Hobfoll (2011) who explains that these caravans are named as such as they travel with groups and individuals throughout their lifespan (as long as continuous drawing on those resources is not triggered – a problem Hobfoll calls loss spiral, Hobfoll, Vinokur, Pierce and Lewandowski-Romps, 2012). Previously in this section and within the fire and rescue service context, Hobfoll’s term of ‘tribe’ was defined to be the Fire and Rescue Service. The rationale for this is that he defines the term ‘tribe’ as being an organisation, or sub-group within an organisation (Hobfoll, 2010). Within the same paper, he introduces the concept of caravan passageways (see previous paragraph). These are conditions which nurture, support and enrich the resources of groups or individuals, or in the negative context conditions which impoverish and frustrate these resources. Whereas passageways define the developmental, lifespan quality of an individual’s resource caravan, pathways are structures within which resources are supplied, protected, shared, fostered and pooled. Within his published work, Hobfoll defines the tribe as a society, community, organisation, department or group of workers (2011). These tribes facilitate resource pathways and in the longer term also facilitate passageways. Therefore the Fire and Rescue Service could be defined in this thesis as part of the COR dynamic for the relatives of firefighters.

The findings of this thesis highlight ways in which the Fire and Rescue Service could facilitate an engaging resource ecology. Hobfoll (2011) defines engaging resource ecologies as organisations (or other such structures) which actively encourage the ‘pooling’ of resources for the employees, departments or groups to access when needed in order to meet the organisation’s needs and goals. Together with COR theory, if (as previous reviewed literature outlines) that firefighters well-being is dependent on social support (from family and co-workers), and this predicates FRS organisational health, then the FRS have a greater interest in their ecology than non-critical occupations. Suggesting the well-being of their employees is (in part) facilitated by their relatives (Brunsdon, Hill and Maguire, 2014) means that the Fire and Rescue Service has an additional interest in the relatives of their firefighters. They offer effective resources which enable their employees to manage stressors and increase resilience to negative emotions and cognitions. Hobfoll (2012) suggests that organisations can exist within larger resource caravan passageways; suggesting the organisation could increase resiliency through enhancing the resource reservoir, caravans and passageways existing around and within it.

In order to explore the wider literature surrounding the context of this thesis, resources will be explored grouped by their common condition and within each tier. These can be seen within table 3.27.2 (by resource type) and 3.27.3 (by tier) below which have been developed through the literature reviewed in this thesis.

Table 3.27.2: Table Denoting Resource Literature Cluster by Type

Personal Characteristics	Objects	Energy	Conditions	Support
Well-being	Living Arrangements	Work-Family Interface	Marital and Employment Status	Kith Family
Fatalism Belief		Kin Family Sacrifices	Perception of Risk	Kin Family
Susceptibility to Emotional Contagion		Continued Personal Development	Perceived Physical Danger	Observation of Traumatic Reactions within Families
Resilience			Attitudes to Safety	
Personal Growth				

These areas will be reviewed and form the main theoretical focus of this thesis. The same conditions exist within different levels from the individual through to culture, which are referred to as 'tiers'. The table below (table 3.27.3) arranges possible impacts by tier.

Table 3.27.3: Table Denoting Resource Literature Cluster by Tier

Individual	Family	Fire and Rescue Service
Perception of Risk	Family Functioning	FRS Family
Perceived Physical Danger	Sacrifices (Excerpts)	Work-Home Spillover
Attitudes to Safety (Trust in Operational Safety)	Secondary Trauma	
Well-being		
Fatalism		
Emotional Contagion		
Resilience		
Personal Growth		

These theoretical foci cluster in different ways within the COR theory, and they have been reviewed within this chapter. Accordingly, some resources or impacts will be grouped together as they draw from a shared theoretical basis (such as perception of risk and resilience). There is one further theoretical consideration in that kin family and the kith (or fictive family) share similar structures, but they are different constituent groups of people surrounding the relative of the firefighter. The function and resources offered by these two structures are likely to be different as outlined in the literature reviewed in this chapter exploring the support the firefighter receives from different constituent groups (co-worker versus family).

The value of these resources both at an individual, family and group culture level will be explored within the context of the firefighting occupation in this thesis. Offering insight as to how relatives of FRS personnel draw on resources in order to respond to the possible consequences and impacts of the firefighting occupation. Specifically, grouping and exploring the resources within two structural levels, the macro level and the meso level as directed by COR theory. The macro level considers the family resources available to individuals, the meso considering the

organisational and cultural group resources available for individuals. The macro level aligns with research questions relating to (B3) what individual and family resources facilitate and maintain the resilience of relatives. The meso level aligns with the research questions (B4) what socio-cultural resources facilitate and maintain the well-being of relatives and (B5) how can the Fire and Rescue Service support relatives to effectively respond to occupational impacts of firefighting and support their firefighter. Other theoretical frameworks were reviewed for this thesis, but none were appropriate. Therefore COR theory was accepted as the framework for this thesis.

Although this theory has strong theoretical support (as detailed in this section), the measurement of the theoretical framework is yet to be established. Therefore, the framework of the theory will be used to align the other areas of research and theories, but will not be used as the outcome measure for this thesis. Subsequently, the outcome measures for this thesis will be resilience and well-being as detailed previously in this chapter.

3.28 Conclusion to Chapter

This chapter section has reviewed the possible consequences and impacts of the firefighting occupation on the relatives of FRS personnel therefore defining the research questions and (A1) what are these impacts on relatives and what are their effects? This thesis will use the research questions presented throughout this theoretical framework to undertake three empirical studies. The thesis will present the empirical and conceptual findings from the research in the hope of advancing theory, knowledge and understanding. With the aim of providing evidenced-based advice for policy makers, practitioners and managers within the fire service community to facilitate the psychological health of relatives and in turn, firefighters. With the theoretical framework established, the next chapter will outline the methodology used within this programme of research.

Chapter Four: Methodology

4.1 Philosophical Underpinnings of the thesis

This thesis took a realist/ pragmatist position (Robson, 2011) within the philosophical approaches to science. The epistemological and ontological position of pragmatism sits between realism and idealism and assumes that there are truths in the world, but it takes both the human mind (which is subjective) and science (which is objective) to access these truths. In so doing the truths are shaped by the process of capturing, researching and reporting the truths (Bem and De Jong, 2013, p. 6). The inductive, constructionist approach (Chalmers, 2003) has been used throughout in order to facilitate testable assumptions. At the heart of this pragmatism the research questions are addressed and presented to frame each empirical study throughout the thesis. In order to answer these research questions a sequential mixed methods approach was used. Accordingly both qualitative and quantitative methods were included and the assumptions and approaches will be covered for both approaches.

4.2 Overarching Methodology: Mixed Methods Approach

A structure was used to ensure the studies followed on from each other in an explicitly interrelated approach. Put simply, they were not completing different jobs, but building to inform the same questions. Robson (2011) highlights that one distinct benefit of post-positivism, such as pragmatism, is that qualitative and quantitative approaches can be used to compliment, rather than oppose, one another. This programme of research in this thesis aimed to achieve this. Study one used a qualitative approach (grounded theory) to establish the psychological impact of the firefighting occupation. To explore and test the theory which emerged from study one, quantitative approaches were used for study two (regression analysis) and study three (path analysis). This would be a robust plan when considering the research from a purely methodological perspective as triangulation is a key underpinning of academic rigour (Johnson, Onwuegbuzie, Turner, 2007). This approach has developed a parsimonious model (through qualitative techniques) then used quantitative methods to test the integrity of factors and establishing prevalence in the sample population. This has enabled a clear path for future research and also a more robust contribution to the literature given the triangulation.

4.3 Sequential Exploratory Design

Sequential exploratory design (Robson, 2011) synthesises findings from both qualitative and quantitative methods to account for a phenomenon. Descombe (2008) defines the approach as having four defining characteristics:

- quantitative and qualitative methods within the same research project;
- a research design that clearly specifies the sequencing and priority that is given to the quantitative and qualitative elements of data collection and analysis;
- an explicit account of the manner in which the quantitative and qualitative aspects of the research relate to each other; and

- pragmatism as the philosophical underpinning for the research

This demonstrates that the characteristics for a sequential exploratory mixed method design have been met for this programme of research.

4.4 Qualitative Research Method: Grounded Theory

Grounded Theory was selected for the qualitative aspect of this research due to its unique ability to generate models of phenomena (Willig, 2008). This thesis seeks to develop a model of the occupational consequences for relatives of firefighters. The requirement to generate a model (theory) necessitates grounded theory as this is the only qualitative method that can accomplish this task (Charmaz, 2003). Regarding the philosophical underpinnings of this approach, qualitative methods mostly sit between critical realism and social constructionism on the epistemological continuum. Grounded Theory has developed since its first incarnation by Glaser and Strauss (1965) to occupy many positions on this continuum as described by Charmaz (2014). The position taken within this programme of research is most closely aligned with Charmaz's description of the constructionist approach (p. 236). The aim of using this practice of the grounded theory method is to generate an explanation of the phenomena, yielding variables and a testable model or theory, whilst acknowledging the interpretative work of the participants and the researcher. The abductive reasoning integrated in to the Grounded Theory analysis (Charmaz, 2014, p.201) synergises the inductive and constructionist positions with the ontology of the pragmatism paradigm.

The constructivist position taken within this thesis also has to be complementary with the pragmatist approach outlined in the discussion previously regarding mixed methods. Although the constructivist position does favour situated, relativistic, subjective methods (Kumar, 2005), Robson (2011) argues that this view is now outdated as epistemology and methodological debates have progressed as post-positivist techniques have developed. This is highly relevant when integrating a constructivist approach with quantitative methods. The notion that the approaches should oppose each other is dated. For example, realists no longer have the need to critique positivism, as the traditional critiques were frequently based on aspects of statistical techniques rather than the assumptions of quantification. Therefore, as methodologies and methods have developed, the juxtapositions between positions have re-settled. Taking a stance of critical pragmatism within the broader stance of post-positivism aligns with the use of both qualitative and quantitative methods.

Alongside these debates of the positions within research methods is the context within which the phenomena operates. The implications of these epistemological and ontological debates have to be evaluated regarding the context of 'real world' research within a cultural and organisational setting for this programme of research. This brings the focus back to Charmaz (2014) and her labelling of the constructivist grounded theorist. She suggests that this approach

can frequently generate 'generalisations situated in...time...and interactions' (p.236) which acknowledge important frameworks such as culture. This thesis has consistently and purposefully paid attention to the culture and emotional context of this research. This has been achieved by using mixed methods, different forms of data collection and ensuring a robust process in the analysis of the grounded theory. Therefore it has drawn on inductive, abductive, constructivism and critical realism within the pragmatist paradigm.

Ensuring a robust Grounded Theory analysis concerns academic rigour of qualitative methods. The first aspect to this is the development of the interview schedule. One to one interviews were conducted due to their flexible and thorough exploration of the phenomena with the participant. Other key factors captured by Ritchie and Lewis (2003, p. 58-59) were considered. These include: the nature of data sought, the subject matter/phenomenon and the research population. These have been considered within each empirical chapter of this thesis so will not be re-visited here. However, considering the rich complex data sought, the sensitive nature of the phenomena, the geographical dispersion of participants and the differing levels of context/culture/structure to be explored, one-to-one interviews were the most suitable data collection method for study one. Developmental and structural considerations of schedule construction were reviewed (Ritchie and Lewis, 2003; Willig, 2001; Robson, 2011; Silverman, 2010; Charmaz, 2014). From this an interview schedule was developed with an overarching aim of allowing reflexive progression (Charmaz, 2014). This is where the concept of the semi-structured interview schedule is developed such that the interview process is taken beyond a co-construction of knowledge and concepts, to recognition of the mutual connection between the researcher and the participant. This development of the interview rapport was an aim for the researcher.

Techniques to ensure academic rigour, quality and validity were employed to ensure co-construction rather than co-creation of the data. These techniques are detailed in a section below after the analytic process has been explored. This is highly relevant as Willig (2001) and Charmaz (2014) fully capture the main critique of grounded theory; it is subjective as the researcher decides which questions to ask in the data collection process. However the use of reflexive progression allowed the participant's perspective to be the focus and the researcher only encouraged rather than explicitly directed, mitigating this criticism. See appendices one for a copy of the interview schedule. However, in order to respond to the theoretical direction of the data, the interview schedule did go through a process of evolution as is encouraged in the Grounded Theory approach (Charmaz, 2014).

The framework used in this thesis to analyse the data collected is based upon the framework developed by Strauss and Corbin (1998) and Corbin and Strauss (2008). This fracture from the original framework offered by Glaser and Strauss (1969) involves a series of steps which establish a "substantive-level theory relevant to a specific problem, issue or group" (Robson,

2014 p.149). The steps taken within this thesis started with a line by line coding of the data and sort to establish initial codes within the data. Focussed coding and axial coding then developed the nature, size and complexity of these codes in to categories.

This thesis completed this process by starting with a detailed line-by-line analysis of each participant's transcript. Coding categories were identified and noted that were generated from the data. This process was repeated through paragraph-by-paragraph and section by section coding. This identified and documented categories which increased in generalisations and overall appliance, generated through the data. Page by page analysis generated overall and general main categories, which were then refined. The remaining, overall main categories were compared to other participant's categories and then put through axial coding which established interconnecting themes. Selective coding clustered and integrated categories as much as appropriate, and produced main categories with peripheral categories which sit within the main categories. At all levels of analysis and coding, negative case analysis was performed which identified contradictory evidence. This contradictory evidence was used to disqualify categories. This process ensured that the theory generated was as unrestricted and true to the data as possible.

This detailed approach to the method was used to compensate for the use of abbreviated grounded theory (data analysis only) rather than 'cyclical interpretative inquiry' (Willig, 2001). This means that although the process of data analysis was engaged in, only one data collection was completed. In short the research did not go back to the participants after their in-depth interview but theoretical centrality (Charmaz, 2014) this was focussed upon instead. This is where the researcher ensures that theoretical development is achieved through saturation rather than multiple interviews. In order to achieve theoretical adequacy, quantitative data collection methods were used for study two and three. This was used instead of full grounded theory in order to also explore research questions outside of the parameters of grounded theory. This verified the robustness of the theoretical concepts by triangulating findings of the phenomena. The process of analysis in this thesis aligned with that captured in the chapter (p. 81-110) within Smith (2003) authored by Charmaz. The process outlined within that chapter was informed by other descriptions of the method (Charmaz, 2014; Ritchie and Lewis, 2003; Willig, 2001) and then contextualised within a particular real world setting using guidance from Robson (2011, p. 489-492). This process reflected the steps taken as outlined in the section above.

The quality and validity process used in this thesis followed well used techniques establishing the quality of data and analysis (e.g. Mays and Pope, 2000; Patton, 1999; Barbour, 2001). The checking procedure to ensure the removal of bias within interview schedules and the triangulation of analysis was completed by the members of the research supervision team. In efforts to give each participant voice, transcripts were fully analysed, rather than the analysis of one interview serving as the framework for subsequent transcripts. The recommended

techniques were employed throughout to ensure academic rigour. Member checking (Mays and Pope, 2000), was not formally completed as the researcher did not return to participants, additionally the quantitative process allowed for this to be completed through another approach.

Further to the validity check of inviting informed other's to ensure academic rigour, the qualitative analysis was also put through the five validity checks as outlined in Silverman (2010) yielding positive outcomes for the qualitative study for each technique.

- 1) The Refutability Principle was achieved through the use of quantitative methods in study two and three. If the quantitative findings refuted any of the relationships, then this would indicate that the initial model developed from study one does not capture the occupational consequences for relatives of firefighters. This takes the framework of triangulation from agreement between researchers to agreement between methods, focussing on refuting the findings.
- 2) The Constant Comparative Method was unable to be completed as a corpus of data was not available; this is the first study on this population within the UK. However, the researcher did attempt to complete the comparative technique with the two papers by Regehr, Dimitropoulos, Bright, George and Henderson (2005) and Kirschman (2004). This was to see if similar structures and concepts bore out in their findings; the findings were aligned so this was deemed a positive test of validity.
- 3) Comprehensive Data Treatment was also successful; all qualitative data sets were used to trial the generalisations gained from the model.
- 4) Analytic Induction was used to ensure the data were accounted for and universal categories were developed as appropriate.
- 5) Related to the action above, Deviant Case Analysis was also used.

One indicator of quality qualitative research as defined by Willig (2001) is reflexivity. The definition and action of reflexivity has been debated in published literature (for example see Silverman, 2010; Ritchie and Lewis, 2003 for contrast). Within the interviews, establishing reflexive progression was a key aim within this thesis. Ashworth (in Smith, 2003) suggests that co-construction of research demands reflexivity be attended to. Some aspects of reflexivity have been addressed in the epistemology and philosophical discussions. However, in line with the demanding definitions of reflexivity (Charmaz, 2014), such as the explicit role and cultural knowledge of the researcher, this will now be explored using the reflexivity as defined in (Charmaz, 2014, p.344):

“The researcher’s scrutiny of the research experience, decisions, and interpretations in ways that bring him or her in to the process. Reflexivity includes examining how the researcher’s interests, positions, and assumptions influenced his or her inquiry. A reflexive stance informs how the researcher conducts his or her research, relates to the research participants, and represents them in written reports.”

The discussions throughout this chapter relating to methodology, methods and paradigms have addressed large parts of reflexivity; the reader now appreciates the positions and assumptions taken by the researcher. The research experience, decisions and interpretations of the researcher will be captured throughout the rest of this thesis. The researcher is the daughter of a firefighter. Her father served for 35 years retiring seventeen years before the submission of this thesis. Therefore, due to the risk of not successfully bracketing out, the indicators of both quality and validity were important features attended to throughout this thesis.

4.5 Qualitative Data Collection

The qualitative phase of this thesis involved face-to-face data collection, affording the opportunity for the researcher to monitor the participant throughout (Willig, 2001). Sensitive areas of research such as traumatic reactions, demand the researcher to manage their duty of care assiduously (Sieber, 1992). If the participant became distressed at any stage, they could be reminded that they were free to withdraw, pause or omit any questions they feel too sensitive. Study one was purely qualitative, using abbreviated Grounded Theory ensuring the model was emergent from the data rather than from pre-existing knowledge and understanding in the literature or in the researcher (Charmaz, 1990). This would address the need to develop a model (in the absence of integrated research literature) without jeopardising the duty of care to participants (Charmaz, 2006). Face-to-face data collection also afforded the researcher to ensure that the participant gave fully informed consent, having been explicitly made aware of the phenomena being researched. In exploratory work it has been widely recognised that qualitative research should be used to establish relationships, dynamics and typology of aspects within the phenomenon (Ritchie and Lewis, 2003; Smith, 2003; Silverman, 2010). It was for these reasons that the data collection of the exploratory qualitative study was completed face-to-face, as opposed to online (through email, instant messaging or forums).

4.6 Quantitative Research Methods: Regression and Path Analysis

The underpinnings of the quantitative techniques will now be examined. Following the identification of a conceptual model of occupational consequences for relatives of firefighters through qualitative methods, quantitative methods offered the opportunity for a very different examination of the phenomenon. The exploratory nature of Grounded Theory established variables associated with consequences and this knowledge was further developed through using multivariate techniques; transcending to a confirmatory approach. This development between methods is consistent with the mixed method approach.

The quantitative data collection are addressed in other areas of the thesis; see chapter 6, section 6.1 for a discussion of the move between conceptual model to operational model, see chapter 6, section 6.3 for a discussion of scale selection to operationalise the model. Data collection for the quantitative aspect of this research programme was collected over two time

points, for a full discussion of data collected between these two time points please see chapter 7, section 7.2 and chapter 8, section 8.2.

The research questions relating to study two required exploration of a predictive model in order to explore relationships between individual and kin family resources. A linear regression analysis was completed to test the overall model and direct relationships between the variables. For study three, the research questions required testing a model of direct and indirect relationships using path analysis. Within this analysis, relationships within causal models are tested to see if they are consistent with collected data by assuming a momentary time lag between cause and effect, despite the model testing being simultaneous. In this respect the testing of the model is confirmatory, but carried out within an exploratory framework. Knowledge of causation and intervariable relations was enhanced through an iterative approach which uses path analysis. The Alternative Model Approach (Bryne, 2010), has a small number of a priori models of relationships between variables, guided by the findings of study one and comprehensive reviews of literature. These small numbers of pre-determined models are then compared to establish their comparative plausibility (Bryne, 2010).

The rationale for the selection of path analysis from the suite of multivariate analyses is that other analyses are more descriptive and do not facilitate the estimation or modelling of indirect effects. Mainly, the advantage path analysis has over other multivariate analyses is the capturing of error. Using this technique, the variables established in study one were modelled, hypothesised and tested in study two and three. Path analysis balances explanatory power (usually associated with good explanations of covariance scores) with parsimony (Tabachnick and Fidell, 2014; Bryne, 2010). The model assesses scores and wider psychometric literature acknowledges the fallibility of prediction and measurement. Therefore throughout this thesis, the context of understanding will be that the measurements of variables are purely the indication from scores. A common mistake within literature using multivariate analysis is that the measurements of variables are taken as phenomena in and of themselves, rather than simple indications.

Multivariate Analysis of Variance was performed to establish significant differences between participants. This is a test of difference and therefore no directionality or relationship is inferred. The findings from these tests of difference were informed by other findings to infer relationships in the discussion and integration of findings.

4.7 Quantitative Data Collection

Once the phenomenon and associations within it were established, studies could focus upon prevalence and causality allowing for online data collection through survey designs. This allowed the possibility to sample from a greater geographical area. The ethical considerations still needed to be observed and fully understood by the participant. Therefore online data

collection yielded benefits of time (to both the researcher and participants), cost and increased geographical catchment. Further considerations of online data collection are covered in empirical chapters seven and eight of this thesis.

Process Used to Select Measurement Scales

From the literature reviewed in chapter three, conceptual overlap, representation and similarity of each measure was reviewed against the category from study one for fit (face validity). Measures were considered using a range of evaluations guided by literature. Streiner's (1993) checklist of reviewing scales using theory and evaluation indices was used to shortlist measures within the literature. This checklist advocates reviewing the scales from item development, construction and performance as well as reliability and validity statistics and overall scale performance. This checklist was used to guide decisions for all of the scales selected in this programme of research. Furr (2011) was used to ensure best practice was achieved in the final scale selection from the shortlist generated by Streiner's checklist. The process is outlined as follows: having been assessed for face validity, measures were then sifted based upon the number of dimensions within the scale. This was regarded as an important criterion based upon the specific nature of the constructs from study one, the research would hold greater integrity if the scales were either unidimensional scales or subscales of bigger measures with their own psychometric evaluation to ensure the scale was measuring one psychological construct. Multidimensional scales were not preferred as they demand more psychometric evaluation; considering correlations between dimensions and the distinctness of psychological constructs between dimensions. This advanced level of evaluation and treatment is often missing from scale development to an acceptable level. The other reason that multidimensional scales were not included in their entirety (even if they had been subject to appropriate rigour of psychometric evaluation) is the potential of redundant subscales. Including a multidimensional scale adds to the overall length of the questionnaire pack. This was deemed too great a cost to the potential completion and response rate, considering the associated participant exhaustion with longer questionnaire packs.

After the validity and dimensionality was considered attention was paid to reliability values of the measures. Internal consistency and test-retest were examined (if available). In some instances, particularly with single item measures of risk perception, only test-re-test values were available. Consideration was given to scale content validity (please note that this is not a repetition of face validity, see Furr, 2011 for details of the two distinct approaches), internal structure of the measure, response processes and associations with other measures (both convergent and discriminant evidence). This evidence was used to select the final measures. Not all of these aspects were satisfied; some psychometric evaluations were not as robust, scales were not all strictly unidimensional or the Likert scale as unproblematic as the researcher would have hoped. However as research is not conducted in a vacuum, decisions were made based on a scale of 'least harm' to the integrity of the research. In response to this, corrective action was

undertaken throughout the research to accommodate these risks. These included the analysis of Cronbach alphas for all scales using the data from the thesis sample, the use of adjusted Bonferroni and necessary caution of interpreting results.

Structure of Data Collection

Quantitative data were collected in two waves. Of the variables and associated scales identified through the process outlined above, theoretical knowledge and frameworks were used to assess which were most suited to each study. For example, variables associated with resilience, personal growth, emotional contagion, kin family and attitudes to safety were contained within study two. Variables associated with risk perception, well-being, trust in operational procedures, secondary trauma, work-home spillover and sacrifices were contained within study two. That way no data were double counted and cross-pollination of variables between studies was prohibited.

4.8 Sampling Considerations

Linkh (2005) and Greene, Kane, Christ, Lynch and Corrigan (2006) suggest firefighters have a strong fire service 'family' or 'culture'. Greene et al. argue that in order to understand the relatives' perspective, the fire service culture needs to be explored through the firefighters as the relatives become 'embedded' in that culture. Linkh (2005) suggests that relatives manage the reaction of their loved one amongst their own reaction to events and experiences. Therefore the reaction of the loved one should be considered as that reaction would be interconnected heavily with such things as the culture of the watch and the ways in which they work.

Accordingly, sampling had to consider the variants of firefighters' working practices by consulting a document anecdotally referred to as the 'Grey Book' (full name: National Joint Council for Local Authority Fire and Rescue Services; Scheme of conditions of service, 6th Edition, commissioned by the Fire Brigade's Union). Within this document are all the conditions of service and employment of firefighters up to Area Manager level (akin to a regional manager within private industry). Working practices and shift systems were reviewed and informed research design. Capturing the relatives of firefighters working in these different contexts was considered by this thesis.

Qualitative study one captured these different contexts by using a stratified purposive sampling, otherwise referred to as strategic sampling (Ritchie and Lewis, 2003). This sampling method aimed to draw variation from the homogenous, purposive sample of spouses and relatives of firefighters. The strategy attempted to include relatives with firefighters occupying as many different ranks, roles and situations as possible. This also included the situation of the relatives, including a wide range of ages and geographical location. This aimed to ensure the phenomena was examined through as many different perspectives and representations of the phenomena to increase academic rigour and integrity. The main inclusion criteria required the participant to

have lived with a serving firefighter for at least a number of months in order to ensure any impacts from the occupation were exposed to the relative. The term firefighter encompassed both full-time and part-time firefighters so recruitment of participants set out to encompass relatives of both. Purposive sampling was achieved through a series of targeted communications to relatives of firefighters through the fire community (empirical chapter seven, section 7.3 and chapter eight, section 8.3).

4.9 Conclusion to Chapter

This chapter has established the methodology used in this thesis. A sequential mixed methods approach was used to establish and test models of resilience and well-being within this population. The following chapters report the empirical studies.

Chapter Five: Empirical Qualitative Study One

5.1 Introduction to Chapter: Exploratory Scoping of the Phenomena and Developing Theory

An overall theoretical model for this phenomenon was developed from the lived experience of relatives of firefighters. As well as providing an overall model of occupational consequences for relatives of firefighters, the chapter aimed to meet the research questions of the thesis to establish the impact on relatives, their nature and mechanisms on relatives.

5.2 Method

The researcher approached relatives from three UK Fire and Rescue Services. The researcher approached the Fire and Rescue Services and asked that they publicise the research on their intranets. The researcher's contact details were provided in the recruitment information and relatives contacted the researcher if they wanted more information about participation.

5.3 Design

A qualitative approach was employed for this study using the experiences of 10 participants. The selection criteria for participants were that they had to be related to, and have lived with, their firefighter. The in-depth interviews allowed for flexibility, for example if the participant generated information that the interviewer would like to expand on, they were free to pursue avenues of interest which hold relevance and value to the study. It also enabled the generation of relevant, accurate but highly specialised theory of the subject area. For a review of the analytic process, see the methodology chapter (section 4.4).

5.4 Sample

Participants were identified and selected through strategic/theoretical sampling in order to gain a multi-dimensional perspective of the phenomena in question (Robson, 2011). The sample was restricted using inclusion criteria. Criteria specified that the participants had to have lived with a serving firefighter. Relatives were selected informed by work patterns, relation to fire personnel and length of service of personnel in order to access as many perspectives as possible of work and family interface. Relatives were asked to take part in the research and theoretical saturation was completed at a sample size of 10. Participants were aged between 26 and 58 (mean = 39.4 years). Within the sample, only one participant was male.

Table 5.4.1 Participant Information for Study One

Pseudonym	Age	Occupation	Relevant Information
Sally	46	Childminder	She has been married to her husband for 20 years and they have 2 teenage children. Her husband holds the position of an area manager within the FRS and works a flexi-duty work pattern.
Fiona	57	Education Professional	She has been married to her husband for 28 years and they have two adult children. Her husband holds the position of a senior manager within the FRS and works a flexi-duty work pattern.
Jane	46	Carer	She has been married to her husband for 21 years and they have two teenage children. Her husband holds the position of watch manager within the FRS and works a community firefighter work pattern.
Lisa	37	Full time Mother	She has been married to her husband for 12 years and they have three young children. Her husband holds the position of a middle manager for the FRS and works a flexi-duty work pattern.
Emily	34	Part time Estate Agent	She has been married to her husband for 5 years and they have two children (10 and 7 years old). Her husband holds the position of a crew manager within the FRS and works a retained work pattern.
Laura	29	Full time Mother	She has been in a relationship with a firefighter for 7 years and they have two young children. Her partner holds the position of firefighter in the FRS and works a retained work pattern.
Anna	32	Part time in local government	She has been married to her husband for 10 years and they have two young children. Her husband holds the position of both whole time and retained firefighter within the FRS and works both the shift system and retained working patterns.
Susan	29	Full time for the FRS	Susan holds the position of crew manager of control operators and works a shift system work pattern. She has been married to her husband for 9 years and they have two young children. Her husband holds the position of training manager within the FRS and works a flexi-duty work pattern.

David	26	Public sector worker	His brother has been in the FRS for 10 years, he now holds the position of middle manager in the FRS and he works a flexi-duty work pattern.
Ella	58	Retired Teacher	She has been married to her husband for 30 years and they have four adult children. Her husband held the position of watch manager within the FRS and he worked a shift system work pattern. He has been retired for 10 years.

5.5 Procedure

The semi-structured interview was purposefully designed to elicit events, responses and implications of having a relative who is a serving firefighter. For interview schedules, see (Appendices 3). When points of interest emerged within the interviews, viewed to be of relevance and value, within the participant's responses, the interviewer was free to explore these avenues. Once the participant indicated they had reached full exploration of the subject matter, the interview was concluded. The participant was then fully debriefed and thanked for their participation and time. All names of participants, peripheral individuals, locations and points of reference were changed to pseudonyms in the transcription process to protect the identity of participants, their partners and the partner's organisation. The interviews took approximately one to one and a half hours and were audio recorded.

Table 5.5.1 Key to Transcription Method (taken from Potter, 1996)

(...)	Represents that words are un-deciphered.
(.)	Represents when there is a pause in the dialogue long enough to hear but not time, when the brackets contains a number this indicates the pause duration.
[]	Represents when there is both interviewer and participant talking at the same time, or laughing.
CAPITAL LETTERS	A word, phrase or sentence written in continuous capital format represents a raise in volume of the speaker.
<i>Italics</i>	A word, phrase or sentence written in continuous italics format represents the words italicised are emphasised or stressed.
--	Represents that the word between the symbols is quieter than the rest of the dialogue.
(-)	Represents that the word is higher in pitch than the rest of the dialogue.
(_)	Represents that the word is lower in pitch than the rest of the dialogue.

5.6 Ethical Considerations

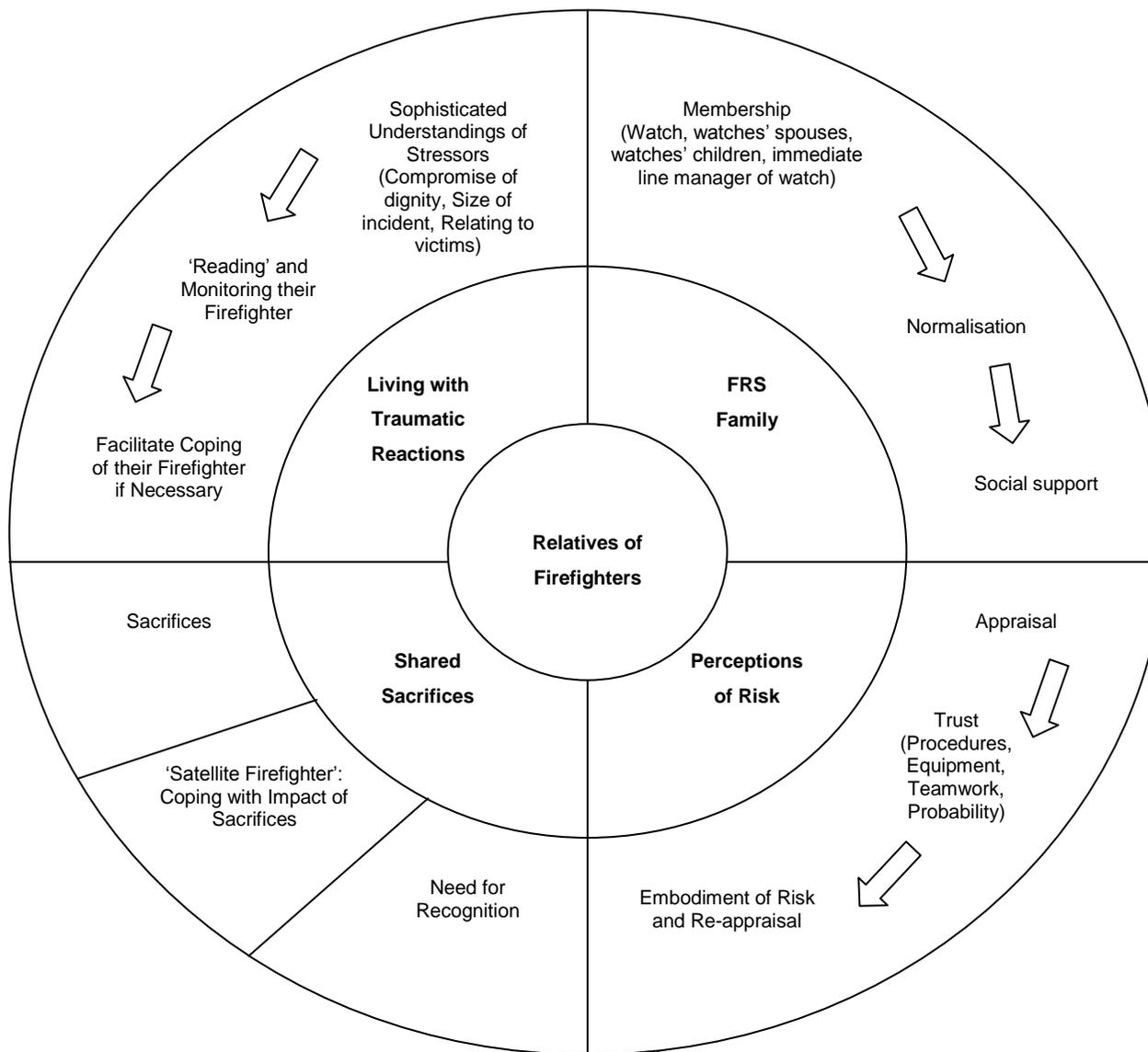
The British Psychological Society Code of Human Ethics (BPS, 2014) informed the research design. Methods were employed to ensure the anonymity of data and confidentiality of personal

data. Participants were reminded of their withdrawal rights before, throughout and after the interviews. All participants were debriefed and offered contact details for the Fire Fighters' Charity helpline in the case of any adverse reaction to participating.

5.7 Analysis

Four main categories emerged with supporting peripheral categories for each main category. These peripheral categories integrate and develop to support the core categories (see Figure 5.7.1 for an overview of the emergent model).

Figure 5.7.1 Model of Occupational Impacts for Relatives of Firefighters



5.8 Shared Sacrifices

The main category of Shared Sacrifices emerges from three peripheral categories: participants' identification of sacrifices they have made for their relatives' job, how they cope with the consequences of those sacrifices and also the expectations they have for the FRS to recognise their sacrifice. This category emerges from data highlighting the engulfing nature of the FRS, reflecting the intrusive, sometimes beneficial spillover. This spillover is delivered through the organisational structure, the culture and the compromises that relatives feel compelled to make given the community service that the FRS provides. Examination of the peripheral categories will evidence and detail the understanding of this initial description.

5.9 Sacrifices

Participants' talk reflected two peripheral categories: sacrifice made in relation to the culture and nature of the FRS, and sacrifice made in response to the work patterns. However, both peripheral categories had the same outcome of feeling that the FRS was a lifestyle rather than just a job their relative undertakes. The following excerpt demonstrates this:

“you absolutely get engulfed in the Fire, Fire Brigade, and everything I mean it, it, it you sort of get sucked in and become part of it if you see what I mean? It's not just you know, it's because it's, it's more than just a sort of job thing it's a way of life thing” (Lisa)

Other participants echoed the sentiment of the excerpt above. Relatives spoke frequently about the job as a lifestyle or a way of life, mostly this was in relation to time spillover, but other sources of spillover emerged from the data which contributed to the relatives' perception. A sense of shared identity between organisation, employee and employee's family was consistently repeated in the data. The excerpt below is one example:

“Some have been given roles that their not happy with some of them are, erm, just doing Community Fire Safety although we say just, it's a massive, that's the top priority at the moment” (Jane)

Within the excerpt, Jane identifies herself as part of the FRS when stating 'we say...that's the top priority at the moment' reflecting her shared sense of belonging to the FRS. Relatives used other references such as 'our', 'we', 'all of us', 'the group' when referring to their relative's organisation. Alongside the explicit inclusive language, emerging from this excerpt is a second reflection of the shared identity that all relatives demonstrated; that is, a developed awareness of FRS complexities. When Jane talks about Community Fire Safety, she is referring to a change in purpose of the UK FRS to prevention rather than response. Through her talk Jane also demonstrates an awareness of how this has been implemented at a local level within her husband's FRS. Relatives have detailed knowledge of political and community agendas, policy, procedure (both on and off the fireground), interactions with local government bodies,

terminology, and equipment. Fiona and Jane, who both talked about sharing their husband's job, referenced how they took shared responsibility for their husband's position within the FRS. At times, they took this shared identity further and acted for the FRS. An example of this is supporting their firefighter to solve problems, in order to help their firefighter's team to remain close, therefore providing physical help at the station (non-operationally). This was completed despite having no employment with the organisation.

Data also suggested that the culture and nature of the organisation made family life secondary to the needs of the FRS. This was often portrayed in the data through talk of building family life around the needs of the organisation; this is openly acknowledged and considered by the relatives:

"It's just shaped absolutely everything (laughs) I can't, although I'm looking forward to us retiring...I find it quite hard to imagine him without the fire service because it has been so much of our lives" (Fiona)

One way that the FRS needs permeate the lives of relatives is by the role of the FRS being the priority within the family, including a time spillover which impacts on the support for other employment and career progression within the family. This could be through relatives giving up their own careers in order to facilitate the family life, or getting into trouble at work due to being late caused by their loved one's delayed return home due to FRS activities. However, the perception of other employment as secondary is evidenced throughout the data:

"I guess (BROTHER)'s role is probably, is probably perceived by my er family to be more, more important or significant than my role" (David)

Through the data of the relatives, it can be reported that this is not just a perception of relatives, but seen by the wider public and also the FRS. This perception of the importance of FRS work leads to tolerance of practical impacts that FRS work patterns have on shared time between fire personnel and their family. Relatives reported that social family time and social arrangements were frequently disturbed. This was through the attendance at fire calls; however non-attendance could still be as disruptive, with shifts isolating relatives as described by Lisa below. She is discussing the limitations put on her own activities and those of her children from the work patterns:

"Sometimes if he's on a 24, which he's on what 2 or 3 times a week, it means that um I can't go do something and leave the kids with him, erm, so I can't have and regular activities... often the kids miss out on things because (2) erm, we can't physically both take you know, one in this direction and one in the other direction because I can't leave the kids with him" (Lisa)

Relatives describe committing to lonely hobbies instead of social activities in order to accommodate the work patterns. Relatives also pointed out that shared activities with the firefighter were compromised, David describes how he spends time differently with his brother now that he is on call and they are not able to do the things they used to do together. However, the impact of working patterns were also celebrated and seen as a positive for the family. This is partly because the shift system was identified as facilitating dual care giving for families. Firefighters spent their days between night shifts and their off days fulfilling the role of primary care giver for their children. Relatives reported that this was seen as galvanising their family unit and actually bringing them closer as a family. This strong emerging category was unanimous among all participants, suggesting clearly defined shift systems are positive for young families.

5.10 Managing sacrifices

Participants were accepting of the sacrifices they were making, and reported ways in which they had overcome the impacts of their loved one's work. However, in order to overcome these impacts, participants reported that they had to make further sacrifices. One way in which all relatives attempted to resolve the disturbances on their shared family and social time was by planning to expect the unexpected. This is represented well by David when discussing shared time with his brother when on call:

"We don't plan to do anything when he's on, on call. We don't do anything that he can't get out of at a seconds notice so it's erm largely manageable" (David)

All relatives discussed this conscious decision to plan flexibility at certain times. However, relatives also actively planned around the unexpected, regularly developing strategies to problem-solve and ensure their family was unaffected if their firefighter were to be called away. They planned for the family, but also planned their firefighter out of any family responsibility. They achieved this by trying to keep everything 'normal' as can be seen by Fiona in the next excerpt:

"I think I've got a complicated life because of the Fire Brigade you know we're trying to organise everything and keep, keep a sense of normality and get to everything" (Fiona)

This organisation and determination to achieve a 'normal' life as discussed by Fiona can be found in all participants' data. They spoke about planning to do an activity despite the firefighter's shift by taking two cars and two sets of house keys, and by relatives either drawing on their extended family to try and fulfil activities for any children. Participants' decisions to try and achieve this are driven by a rejection of the alternative as discussed by Ella:

"I know that if I wanted to go he would have said 'Just you go along'...But I didn't particularly want that type of life, where we live different things" (Ella)

Relatives rejected the possibility of living separate lives to their firefighter. Instead, they developed a family routine separate to the FRS routine (as they identified that as an ever-changing routine), adapting family life to cope with the effects of FRS work. This 'normalisation' was achieved through developing a family life with the fire personnel as a satellite to the family. This practical managing was also coupled with an emotional justification provided by relatives of the sacrifices detailed above. All relatives spoke of tolerating the engulfing nature of the FRS because of the essence of the FRS work. Relatives spoke of pride in their loved one for serving their community and working in a helping profession, this can be seen in the following excerpt:

"It's more than just a job, it's erm you know being very much a part of the community so because he's so erm keen on that and involved in that you know it doesn't really bother you that you know the, the down side of it really" (Anna)

The 'down side' as described by Anna is that their efforts and need for unique family plans were not perceived to be recognised by the FRS which relatives felt frustrated by. Relatives reported their expectation for the FRS to recognise the impact and sacrifice of relatives.

"Making it much more family friendly and family orientated, so that, that there isn't this 'well your family, they're used to it, they'll just wear it, you know, they married in to it and can get on with it' sort of, do you know what I mean" (Lisa)

This absence of recognition from the FRS of the price to the family of FRS employment is developed further by relatives. They suggest the FRS should have a support mechanism in place for the families and spouses of FRS personnel:

"I know they need something obviously because as I say the wife is as much apart as the husband and we're making a lot of the sacrifices" (Emily)

Some of these calls for further support were motivated by the awareness of risk within their loved one's occupation, this will now be explored through the main category of 'Perceptions of Risk'.

5.11 Perceptions of Risk

All relatives discussed the perceived dangers of their loved one's occupation. Most recognised that the potential danger was also the attraction of the role for their loved one. Relatives engaged with this risk appraisal on a day-to-day basis as the excerpt below suggests:

“Well I suppose always at the back of my mind I’ve always, you know, there’s always that fear erm, the knock, there might be a knock on the door you know that something’s happened that, that is definitely always there, erm but you, I mean it’s a day to day thing” (Anna)

Their talk suggests that although the perception of risk (both physical injury or death, and emotional traumatic reactions or occupational stress) permeates through family life, it does not engulf it (as demonstrated in the main category of Shared Sacrifices). This is because most relatives use avoidance, they report putting it to the back of their mind and not allowing themselves to think about it. However, their perception is altered and they are forced to re-evaluate their perceptions of risk through witnessing aspects of their loved one’s operational duties. For some, this was seeing the incident from afar, for others it was merely seeing the immediate physical effects of an incident on firefighters before they had chance to change (identified by the data as ‘looking sweaty’, ‘covered in smoke’, ‘hungry’ and ‘physically exhausted’). With this constant threat of risk, data also revealed relatives’ strategies to cope with the perceived dangers of FRS work. Relatives trusted in training procedures, equipment, experience of the firefighter, decision making ability of the firefighter, and teamwork between the watch, to cope with the possibility of risk to their loved one:

“I think wherever possible people are trained for every eventuality and they’re wrapped up in cotton wool with health and safety and risk assessments and everything else; really got to be something fairly unexpected and significant for, for you know a fireman to be injured” (David)

It is this trust in process which enables relatives to cope with their perception of risk to their loved one. Relatives did not report a reduction in the perception of risk to their loved one, more that this trust enabled them to cope with a constant perceived level of risk. It is termed as ‘trust’ in this study as when asked about these processes, relatives had little knowledge of them beyond the terminology. However, they were clear that they also put their trust in probability, reporting that their loved one was more likely to be injured travelling to work or an incident, rather than at the incident itself. They did have some knowledge to support the assumption that a road traffic collision was more likely than an accident at their relative’s work. All relatives inferred that if their loved one was injured at work they would expect support from the FRS. This can be explored through the main category of ‘The FRS Family’ later on in this chapter. Relatives were also acutely aware of emotional risk to their loved one as well as physical risk; these will now be explored through the main category of ‘Living with Traumatic Reactions’.

5.12 Living with Traumatic Reactions

The emotional risk involved in having a relative in the FRS was discussed by all participants and framed as being a part of family life. The data discussed the emotional consequences for their loved one through having an FRS role, which in turn impacted upon the participants. Relatives reported that exposure to serious, or gruesome, incidents for their firefighter meant they lived

with their traumatic reactions to these incidents. These were initially confusing to relatives, but with more experience they became accustomed to 'reading' their FRS loved one and took their lead from them in order to try and deal with the reactions. Relatives explained that their main concern was not the effect this had on their family life, but more the impact it was having on their FRS loved one. Relatives detailed the types of reactions, both physical and emotional, including the reactions that their firefighter might not be aware of:

"for months afterward he, he was urm, he was dreaming about it you know jumping on the bed and screaming at people that he was coming to get them and everything like that" (Fiona)

Fiona was not alone in reporting these types of behaviours in their loved one. All relatives demonstrated an awareness of traumatic reactions and reported that it was something they consciously thought about and, in all cases, acted on by proactively facilitating their firefighter's coping. Emerging from this data was the way in which relatives actively managed their loved one's emotional spillover from their job in order to try and keep them emotionally healthy:

"we've been very fortunate that any of the accidents that (HUSBAND) has attended, yes there has been fatalities, but nothing that has caused him and problems with stress because as soon as he comes in I make sure he talks about it" (Jane)

Relatives talked about monitoring reactions and mood states after every incident that their loved one attended, this was mostly done through initiating discussions of the incidents. Although relatives reported that their loved one 'edited' the discussions to protect them from distressing detail, the relatives had a sophisticated understanding of possible distressing incidents. Relatives spoke of different types of incidents being challenging for diverse reasons, and the scale and nature of the incident influenced reactions; more complex reactions came from bigger incidents where victims were unrecognisable as human and where firefighters could relate to victims (such as having children of a similar age). At times these reactions had consequences on the family life beyond those described in the main category of 'Shared Sacrifice' as described below:

"when he came home he wasn't in the right mind to go to a friend's barbecue or to celebrate a birthday or something" (Ella)

Once the reactions had been noted by relatives, they initialised known coping strategies of their relative. This could be through further conversations to diffuse the firefighter, or other emotional and practical ways of coping. Whatever the coping, relatives facilitated that coping strategy for the firefighter. Ella gives an example of this facilitation below when describing how her husband talks to her about traumatic incidents:

“I think er it made me understand sometimes when he came home erm (.) that why, he wanted to just say hello, drank coffee and go and have a dig in the garden...cause he evidently wanted to get some things straight in his mind” (Ella)

Again, the relatives report that their concern is to process their firefighters emotional position as described by David below:

“I’m no expert but I’m sure that there’s evidence to suggest talking about these things helps people process them and deal with them” (David)

By monitoring, facilitating and managing their loved one’s reactions, relatives hope to process the reactions and keep their loved one emotionally healthy. This active process reflects the emotional spillover from their loved one’s role in the FRS. However, relatives also report this sharing of emotion as enhancing their relationship, as the following excerpt describes:

“I think because of his job, and because he shared certain aspects with me, I think we have got a closer relationship” (Ella)

This unhindered communication appears to strengthen the relationships between the family and is a positive aspect of their loved one’s employment in the FRS. This support within the family in dealing with emotional reactions is also reflected outside the family in the wider FRS network referred to the “The FRS Family”, this is also seen as a positive spillover from their loved one’s FRS work.

5.13 The FRS Family (Support)

Relatives explained that a ‘work family’ emerges as an inevitable outcome of the teamwork and sacrifices for the job, and that the ‘work family’ and real family overlap to form a whole. This wider collective group was sometimes referred to as “the group”, “the family thing” or “the fire brigade family” and is defined throughout the data from this study as an extended family. Most relatives provided a definition of who was included in this FRS Family: the team of FRS personnel, their spouses, their children and the immediate layers of management above the team of FRS personnel. This is supported by the absence of this phenomenon in David’s data; he is the brother of a firefighter. The main function of this network is for support, originating through a shared identity. It was referred to frequently when talking about difficult or stressful times. The support is provided and expected within this family dynamic, providing both a social support network and friendships amongst operational staff and their families. Support was reported as being a pivotal way to normalise the spillover and experiences of families (as described within the other main categories). This can be demonstrated through the following excerpt:

“As well as being out and socialising you’re actually benefiting quite a lot from just speaking to other people who have similar issues” (Anna)

This reassuring role of the FRS Family allowed relatives to speak of both emotional and practical difficulties and share their experiences of coping. When relatives spoke of support, they mainly referred to peer support. This peer support was even extended between the children of FRS personnel:

“It’s mainly the, the other wives and partners and also you know the kids as well, because the kids will have to live through all of these things as well” (Lisa)

By other things, Lisa refers to the spillover from the work of the FRS which is outlined in the other categories above. This main category feeds in to all other main categories as relatives often use the FRS Family as a resource for developing their ability to cope. This is further supported by the following excerpt:

“When I had chatted to other relatives of firefighter’s erm and you know, said, you know, what, what, what happened with your lot you know, how, how did they get on and how are you feeling” (Laura)

This excerpt demonstrates the communication between relatives in order to establish shared feelings and understandings of the firefighter’s role. This expectation of support from the FRS Family was evident in the data:

“I mean that’s what you grow to expect I mean because you you live your life in the service, therefore you expect a level of erm, sort of help and support back” (Lisa)

All participants who were spouses of FRS personnel expected the FRS Family and the formal FRS to offer practical and emotional support through difficult times (such as injury, recovery or bereavement). This reflected their belief that their loved one expected both informal and formal support in difficult times. Some relatives suggest that this expectation is anchored in the culture of the FRS, encouraged in previous years by the FRS when modern support systems were absent:

“It’s just like having an extended family, the family (.) the family in the past used to work with it’s networking systems and it’s support systems and I think they were just mimicking that...personnel was a very small thing and it just dealt with your pay packet...the best system that they could think of er working with all the extreme emotions” (Ella)

Relatives spoke of the recent decline of FRS encouragement for families to attend station open days and social events compared to previous years. This was regretted by spouses of FRS personnel participating in this study, particularly because of the absence of peer support between relatives. The excerpt above makes reference to the 'extreme emotions' which is generated by FRS work, the importance of normalising these extreme emotions and offering reassurance and strategies to relatives is what the relatives were focussed on. When dealing with traumatic reactions, relatives sought reassurance from peers that their relative was having a normal reaction to an abnormal situation and not vice-versa. This sharing of experiences and coping led to a shared identity between the relatives of each FRS Family. The excerpt above from Laura mentions "your lot", this is echoed throughout all data of spouses of FRS personnel. The shared identity explored in Shared Sacrifices offers further insight to this, but whereas previously it referred to the organisation, this shared identity refers to the smaller group of the FRS Family. This feeds into the expectation of support from the FRS Family:

"There's kind of level of support that you expect and...plenty of the partners of the people that you know are involved would come out and help you um and give you support" (Lisa)

Relatives frequently represented both themselves and other relatives as actual members of their partner's watch, identifying with both the FRS (as seen in Shared Sacrifices), with the watch and also with each other.

As evidenced repeatedly through this analysis, FRS work does create points of spillover into family life.

5.14 Discussion of Findings of Chapter

This empirical study has offered insights to the first two research questions of this thesis: (A1) what are these impacts on relatives and what are their effects and (A2) what is the mechanism by which these occupational impacts affect relatives. Through this study, relatives of firefighters have offered insights into the work-family interface have been explored and data identified four main categories that describe the family perspective. First, the process of managing the sacrifices that families are making in order to facilitate the firefighter role is viewed as a potential threat to the family. This is emphasised by the families' need for recognition for making those sacrifices. Second, relatives avoid engagement with their perceptions of risk to the firefighter (physical and emotional harm) and, when faced with cues of this risk, their appraisal is facilitated by their trust in training, equipment and their firefighter's colleagues. Third, the FRS family provides a shared identity and support (both emotional and practical) network for relatives, providing the function of normalising spillover from the firefighter role. Finally, families of firefighters engage in a process in order to manage the traumatic reactions to events which happen in their working life. Family members actively monitor their firefighter for any reactions and use their sophisticated understandings of the impact that the scale and nature of incidents

will have on their firefighter. They initiate or encourage individual coping mechanisms for their firefighter in an attempt to maintain the emotional health of both their firefighter and the family.

The strong sense of FRS identity reflected within the category of sacrifices has been evidenced in other literature (Lasky, 2004; Hill and Brunnsden, 2007). This literature has recognised that the occupation of firefighting necessitates a common sense of belonging between both employees (firefighters) and their families. This has been challenged with the move from a reaction to prevention style of working as instructed at a national level following the Bain Report (2002) and the White Paper (2003). Despite the challenge to their previous way of working within the FRS, this level of commitment to an organisation from the firefighters relatives is still evident within the data from this study.

Data also identified that shift patterns facilitate both parents as primary or dual care givers. This has been evidenced within literature focussing on other occupations using shift patterns (Marcucci, 2001; Day and Chamberlain, 2006). Literature also demonstrates how work and family schedules are negotiated (Barnett, Gareis and Brennam, 1999). This was seen within the shift system but not as easily completed with the flexi-duty system. Instead, the flexi-duty system came with a specific challenge for families. This was that more senior positions should have more flexible hours given the use of technology to facilitate 'smart' working (working where ever and whenever is optimum for the employee). Instead, this facilitative technology facilitates intrusion of work in to the family domain through unintended consequences. This also has been identified in other occupations (Lewis and Cooper, 1999; Voydanoff, 2005).

The two aspects of sacrifices made for the FRS outlined above have been captured in the limited literature which focusses upon relatives of FRS personnel (Regehr, et al., 2005; Kirshman, 2004). The pride relatives feel in their firefighter serving the community was universally expressed. Participant's believed society holds firefighters in high regard, and all spouses reported that the couple had made an active decision to facilitate the role of firefighter. Therefore, because of the joint decision, the joint sacrifice and joint facilitation, the relative felt that they could share in any positive regard that firefighters received. This also supports the shared identity discussed previously in the Sacrifices category and in studies by Regehr, et al. (2005) and Kirshman (2004). The impact of the sacrifices which have to be made by the relatives of FRS personnel are buffered by adult relatives so that younger relatives (such as children) are protected from them; this can also be seen in other occupations (Marcucci, 2001; Stoner, Robin and Russell-Chaplin, 2005). Despite the perceived need to initiate protective behaviours towards certain members of the family from these impacts, relatives do not perceive the FRS recognises the impact and sacrifice experienced by family members. This call for recognition and support from the FRS has previously been outlined in the literature (Kirschman, 2004; Matasakis, 2005; Antonellis and Mitchell, 2005).

Within the discussions of data relating to the perception of risk and physical harm, the trust in occupational processes and procedures that reduces the threat of harm to their firefighter is discussed in the literature pertaining to other situations and occupations. This supports research focussing on high risk occupations (Conchie and Burns, 2008; Flin, Mearns, Gordon and Fleming, 1996; Leiter, Zanaletti and Argentero, 2009). The subtle differences in risk estimation of different activities reflected within the data demonstrates the inoculating factors relatives use to buffer against the probabilities of their firefighter completing work which carries a higher proportion of risks. Discussing risk whilst on the fireground and risks associated with travelling to a fireground is one example where relatives reported different probabilities of harm to their firefighter based on different tasks. This risk estimation supports work completed by Slovic (1987) and Rundmo (1996) who suggest that risk appraisal is challenging when it is anchored to something outside of the individual's experience. Their perception of risk to their firefighter and their constant activity in appraising those risks supports existing literature examining the representation and processing of this risk (Noran, 1995; Matasakis, 2005; Kirshman, 2005; Regehr, 2005).

The category of living with traumatic reactions detailed the sophisticated understandings that relatives have of their firefighter's reactions to their work. Relatives' speaking with their firefighter about incidents that they have attended has received criticism in the literature (Parkinson, 1993). This is because the talk is assumed to be diffusing rather than debriefing. Diffusing is not the same as debriefing; there is little processing of the emotions and anchor event within diffusing. Within most forms of debriefing the main aim is for the individual to process the event and their feelings to/from that event. However, this study has evidenced that a more sophisticated process is occurring between firefighters and their relatives. The relatives monitor, facilitate and manage their firefighter's reactions. By doing these activities, relatives hope to process the reactions and keep their firefighter emotionally healthy. This has been noted by other research (Regehr, 2005; Regehr, Dimitropoulos, Bright, George and Henderson, 2005; Cowlshaw and McLennan, 2006). Additionally proactive behaviours in other organisational contexts highlight the personal costs to other domains within an individual's life when they initiate proactive coping. Hobfoll, Dunahoo, Ben-Porath and Monnier (1994) identified that, in a general population, men have fewer coping strategies than women, and that women offer support to others more frequently than men; concluded that, as society changes, these distinctions between male and female coping is becoming conflated. Consequently, the findings from the current study might be based on the larger numbers of females in the current sample as there are currently more male than female firefighters. Accordingly the current study will not treat this as unique to the impacts of the firefighting occupation, rather as a feature of wider societal findings.

This active coping reflects the emotional spillover from their firefighter's role in the FRS. An inference could be drawn that in order to protect themselves they try to initiate their firefighter's

coping to prevent possible emotional contagion of this spillover. The exact nature of the emotional contagion from critical incident workers to relatives is debated in the wider literature (Matsakis, 2005; Antonellis and Mitchell, 2005; Manguno-Mire, Sautter, Lyons, Myers, Perry, Sherman, Glynn, and Sullivan, 2007; Pfefferbaum, Tucker, North, Jeon-Slaughter, Kent, Schorr, Wilson, and Bunch, 2006; Menendez, Molloy and Magaldi, 2006). However, the importance of the quality of the relationship between individuals with traumatic reactions and those closest to them has been clearly documented (for example, see Tarrier, Sommerfield and Pilgrim, 1999). Relatives reflected this phenomena in the wider literature by reporting that the sharing of emotion from the FRS work enhances their relationship.

The analysis identifies that within the families of emergency service workers they are dealing with traumatic reactions and this reflects literature which has begun to explore this concept (Pfefferbaum, Tucker, North, Jeon-Slaughter, Kent, Schorr, Wilson and Bunch, 2006; Menedez, Molloy, Corrigan Magaldi, 2006; Fratesi, 1998). Although this study cannot say what anchor event the reactions are anchored to (D7), it offers insight into the process which families use to try and address their reactions. Data informs existing research conducted on the spouses of military personnel (Manhuno-Mire et al., 2007).

Another explanation of these processes is emotional contagion or transmission; the passing on of emotions or mood states from work activities from the firefighter to their relatives through interactions. This has been demonstrated within families exposed to stressor and occupation specific contexts (Larson and Almeida, 1999; Barling, 1990; Repetti, Wang and Saxbe, 2009; Roberts and Levenson, 2001; Thompson and Bolger, 1999; Long and Voges, 1987). This discussion relates to the specific occupation of firefighting and the passing on of traumatic reactions from the firefighter to their family members (D8). This offers insight, but more research should be completed to document this process in order to support well-being and resilience in families.

Secondary traumatic stress could also offer an explanation of the process of dealing with traumatic reactions. Secondary traumatic stress (Motta, Kefer, Hert and Hafeez, 1999) suggests families have a traumatic reaction to the symptoms of the traumatic reaction the firefighter is having. Symptoms, such as mood swings, grumpiness, un-warranted aggression and unpredictability (see McFarlane, 1987, for examples) are sufficiently disturbing to warrant some level of traumatic reaction within their relatives (Repetti, Wang and Saxbe, 2009). Future research could offer insights into existing work in this area (Rowland-Klein, 2004; Lombardo and Motta, 2008; Suozzia and Motta, 2004; Scaturo and Hayman, 1992) focussing on disaggregating the causation of the conflict; and the traumatic aetiology (such as social or cognitive impairments). In summary, resolving the nature of the impact of traumatic reactions (emotional contagion or secondary trauma) would advance knowledge in this area.

The phenomenon of the FRS work family has been identified in research conducted in FRS' of different cultural and geographical areas, such as the USA and Canada (see Regehr et al., 2005; Kirshman, 2004). The function of these work families, according to the findings of this thesis is to provide a way to normalise the spillover and experiences of families associated with the FRS. The benefit of normalisation has been evidenced in other critical occupations (as described within the other main categories, and as supported by Jackson and Maslach, 1982, in their study of "police wives"). The supportive function that peer support offers relatives is an important facet of the FRS work family. Again, this has been reflected in other critical occupations (Fratesi, 1998).

5.15 Future theory development and limitations

This thesis has found resonance with previous findings but has also offered insights of processes which had previously been under explored. Although unique in their nature, when compared to findings associated with other critical occupations and wider occupational research, there is resonance. Additionally, this work has established the impacts experienced by relatives of operational firefighters, illuminating (A1) the nature and in what manner they affect relatives. Second, this empirical study has detailed (A2) the mechanisms by which these vicarious impacts affect relatives.

More research needs to be completed comparing different geographical areas with diverse organisational or societal cultural influences. These contexts may generate nuanced versions of needs and the corresponding support systems needed to maintain resilience and well-being of families, and in turn, of firefighters. This potentially could suggest a need to establish suitable support mechanisms. This will be explored further in study three, chapter eight.

Families can be perceived as working for the FRS due to the role they occupy diffusing their relatives, buffering health issues and thereby promoting the well-being and capability of firefighters. Sources of social support for the families, rather than the employee, should also be considered in order to sustain support to the employee.

This study has defined the support from peers and colleagues within the organisational culture as the 'Fire Service Family'. These close co-worker and family networks demand further research to establish the resources offered by this structure to relatives. The social support this study has identified which is offered through a fictitious family (FRS Family) could be further explored through establishing the resources offered by these extended families. Identifying the resources families use and provide to each other, appears to be an essential part of increasing and maintaining resilience, reducing stress, maintaining occupational effectiveness and maintaining well-being. This, alongside the evidence both within this study and supporting literature focussing on emotional contagion (Larson and Almeida, 1999; Long and Voges,

1987), makes a strong argument for expanding future research to consider the structure of resources available to the relatives of firefighters.

Future research could illuminate how the employee can successfully balance spillover (positive or negative) between work and home through the consideration of the family perspective as suggested by Lewis and Cooper (1999) and Perrewé, Hochwarter and Kiewitz (1999). A resource rich family dynamic (including facilitation of support, coping and time) will enable employees to achieve this balance more successfully, bringing benefits to all three domains: the employer, the employee and the family. Future research should seek to identify the intrapersonal, interpersonal and cultural resources used by relatives to maintain their resilience and well-being.

The occupational consequences for relatives of fire and rescue personnel are mostly anchored to appraising threats to their own emotional function, their daily routines and the physical and emotional well-being of their firefighter. Future research should illuminate how the relative appraises and copes with the risk to physical harm of their firefighter.

The approach needed to inform this family perspective will advance and develop the literature of work and family interface. In order to be cognisant of the social and cultural structures (such as the individual, the family, the FRS family and the community) a different methodology and epistemological position will be used.

5.16. Conclusion to Chapter

Study one has identified the impacts on relatives of the firefighting occupation and how those impacts influence the family life of firefighters. In order to explore and test this model further, the family and societal structures identified within study one shall be examined in more detail. Chapter seven will detail an empirical study of the resources at the macro level (individual and kin-family) of relatives as identified in study one. Chapter eight will then detail an empirical study exploring the resources identified in study one at the meso level (individual and wider cultural resources amongst other groups). The theoretical framework used to move from a conceptual model of impacts identified in study one, to an operational model used in studies two (chapter seven) and three (chapter eight) will now be provided in the following chapter.

Chapter Six: Psychometric Method for Studies Two and Three

6.1 Overview: Moving from Conceptual Theory to Operational Model

This chapter focusses on the four main categories developed from study one and the process by which they were moved from conceptual theory to a working, operational, model ready for empirical testing. Psychometric scales measured the factors identified within the Grounded Theory model from study one. Two models of resilience and well-being were tested for parsimony and fit. This chapter outlines the process and considerations when mapping conceptual to operational and the selection of psychometric scales to achieve academic rigour. This framework facilitated the fit of conceptual variables identified in study one with validated scales. Five variables were mapped using aligned literatures, which were extrapolated across to ensure appropriate measurement of the constructs. A piloting process was undertaken which is outlined within this chapter.

6.2 Mapping Concept to Operational Variable: The Process

The process of selecting appropriate scales began with mapping the conceptual model developed in stage one on to an operational model, which endeavoured to measure the constructs captured in those categories. Whilst operationalising the concepts in study one (chapter five) and mapping these onto concepts within the literature, the researcher endeavoured to remain as close to the conceptual model as possible. This was undertaken in the context of a comprehensive literature review that focussed on the literature relevant to each construct and the table below provides an indication of how this was achieved. In the left hand column are the categories from chapter five, in the middle column are the constructs which operationalised those categories from the literature and in the right hand column are the scales which will be used to measure those constructs.

Table 6.2.1 Study One Variables Mapped to Measurement Scales

Conceptual category from chapter five	Operational construct in the literature	Scale name / focus of measurement for studies two and three
Shared Sacrifices	Work – Family conflict	Stevens et al. (2006) adapted from Kirchmeyer (1992 & 1993) 6 items
	Family Processes	The McMaster Family Functioning Scale 12 items
	Psychological well-being	The Warwick-Edinburgh Mental Well-being Scale (Tennant et al, 2006) 14 items
	Personal growth	Ryff (1995) 14 items
FRS Family	Non-kin/fictitious family	The McMaster Family Functioning Scale 12 items
Perceptions of Risk	Perceived physical danger	Adapted from Jermier, Gaines and McIntosh (1989) 5 items
	Risk perception	Adapted from Ganzach, Ellis, Pazy and Ricci-Siag (2008) 1 item
	Trust in procedures/ occupational safety	Adapted from Mearns, Rundmo, Flin, Gordon and Fleming (2004) 13 items
Living with traumatic reactions	Emotional contagion	Hatfield, Capioppo and Rapson (1994) 18 items
	Secondary trauma scale	Motta et al. (1999) 22 items
	Psychological resilience	Friborg et al. (2003) 37 items
		203 items in total (including demographic and researcher developed questions)

6.3 Outcomes of Scale Selection

Using the process outlined in chapter four, validated scales were selected to measure and test the model developed through study one. The rationale will now be outlined for each scale and a brief description of the scales will be provided with relevant psychometric properties.

6.4 Measures of Risk

Relevant literatures included: risk between self, family and the general public, vulnerability of risk to self and family, risk denial, risk severity, self-efficacy, response efficacy, experience with a specific risk (including occurrence and exposure), trust in occupational safety, lethality, control, prevalence, and absolute versus comparative risk. The focus of measures within this literature included: avoidance of risk, appraisal and re-appraisal of risk, trust in training procedures and occupational safety, experience of their firefighter, teamwork of the firefighting watch, probability of risk having an inoculating quality and the perception of risk (not to self but to family member). The three scales remaining after this process were included in study two and are outlined in the following sections (Perceived Physical Danger, Risk Perception and Trust in Procedures and Occupational Safety).

In selecting these scales, the difficulty of operationalising risk perception was that the risk did not pertain to the self, but to another (the firefighter). The risk literature is steeped in measures of risk from a variety of philosophical positions of risk which, on first survey, suggest a few possible matches. However, many of these measures of risk were disregarded on validity measures of perception of risk to self rather than to another. The other reason for the rejection of scales was based upon the construct under consideration. Many scales associated with the measurement of risk are very specific in their measurement of risk messages, risk heuristics, risk biases, risk base rate statistics, comparative optimism, optimistic biases etc. These constructs were decided not to have a good fit with the constructs embedded in the categories from study one. The absence of research and attention on this kind of risk perception included the understanding of risk to another, assessment of what moderates or protects attention to the risk to the other person, and an individual's perception of physical risk from a range of possible threats, rather than just one threat.

Perceived Physical Danger

The scale of Perceived Physical Danger (Jermier, Gaines and McIntosh (1989) is a three item scale with a five point Likert response from 'almost always untrue' to 'almost always true'. This is a global measure of perceived physical danger. For the original research study, the Cronbach's alpha was 0.95 (Jermier, Gaines and McIntosh, 1989). The published work was based on a sample from a police department (albeit the sample was recruited from three groups; patrol officers, investigators and clerical/support workers). The authors have given permission for these questions to be adapted for electronic use in this study. The measure met most of the requirements discussed above; however, the original questions were asked in relation to self, so the researcher adapted them for use in this study. The original questions were altered as follows: 'I encounter personally hazardous situations while at work' was changed to 'They encounter personally hazardous situations while at work'. 'My job is physically dangerous' was adapted to 'Their job is physically dangerous'. 'I am directly exposed to physical harm in carrying out my job' was adapted to 'They are directly exposed to physical harm in

carrying out their job'. Scoring represents that the higher the score on this scale, the higher the relatives' perception of risk to their firefighter, computed through sum score.

Risk Perception

The single item measure of risk perception was adapted from Ganzach, Ellis, Pazy and Ricci-Siag (2008). This measure was adapted with permission from the first author and permitted to be used electronically. Ganzach et al. paper considers two different frameworks of formulating risk; comparing a single measure of risk perception with a multi-item measure of risk perception. The authors conclude that single items of risk perception have strength; therefore, it is their single item measure that this thesis has used to assess relatives' perception of risk to their firefighter whilst at work. The author's original suggestion of 'How risky is the prospect?' was specified to 'How risky is the firefighting occupation?'. As in the original paper by Ganzach et al., the response format was a five point Likert response from 'Not at all risky' to 'Very risky'. The higher the score of the response, the higher the relatives' perception of risk to their firefighter.

Trust in Procedures and Occupational Safety

The scale to measure trust in procedures and occupational safety was adapted from Mearns, Rundmo, Flin, Gordon and Fleming (2004). Three subscales of this measure have been permitted to be used in this study by the original author. However, the original validation of these scales were completed on a sample of Norwegian off shore oil workers; since then a UK sample has also been included in the validation process. All Cronbach alphas quoted below include a UK sample for reliability of measures to be appropriate for the sample within this thesis.

The first subscale selected for this study from Mearns et al. (2004) is the 'Measures directed at personnel'. The question originally read 'Please indicate how satisfied you are with the following safety systems' and for, this study, added on 'within the FRS?' Response options include: First aid training, Safety Instructions/ training, Follow-up measures after accidents, Emergency Response Training, Safety Control and Inspection Routines, Safety Officer, Availability of personal safety equipment. A five point Likert response scale ranged from 'Very satisfied' to 'Very dissatisfied', with a higher score indicating the less satisfied the relative was with the safety systems within the Fire and Rescue Service. In the original study, this yielded a Cronbach's alpha of 0.85. One item from a separate subscale called 'protection measures and housekeeping' was also included in the research as it captured an aspect of the firefighting occupation which is identified in the occupation culture and referred to by participants within study one. This is 'Availability of personal safety equipment'. This item uses the same answer format as the subscale of 'Measures directed at personnel'. Due to the identification of personal safety equipment by relatives of firefighting personnel in study one there was clear legitimacy within the conceptual model to include this item, despite the other five items within its subscale

being irrelevant to firefighting. Therefore that item was included but the other items were discounted.

A second subscale loading on to 'Fatalism' was included in this thesis. This included three questions which were adapted for this study; 'Accidents just happen, there is little one can do to avoid them', 'The use of machines and technical equipment make accidents unavoidable', 'I never think about the risks now that I am used to the work *they do*'. The words 'they do' at the end of the last item were added for this study to make the question relevant and more applicable to the study. The response options for these questions were a five point Likert ranging from 'Strongly Agree' to 'Strongly Disagree'. With a higher score indicating the participant believes their firefighter is in control of their personal safety and the less they believe that accidents, at some level, are inevitable. In the original study this has a Cronbach's alpha of 0.49, but now that the wording has been altered that has limited relevance.

Finally, questions relating to the subscale 'Belief in own safety behaviour' were included and have been adapted, as before 'I' has been changed to 'them' or 'their'. The two questions within this subscale included 'Some people are accident prone' and 'Whenever *they* see safety instructions being broken, *he/she* points them out'. The response option for these questions was a five point Likert ranging from 'Strongly Agree' to 'Strongly Disagree', with the higher score indicating the less the participant feels their firefighter will engage in safety behaviours. In the original study, this has a Cronbach's alpha of 0.28, but now that the wording has been altered that has limited relevance.

The Cronbach alphas for these scales are low; however, the rationale for including them is that these were the only scales to conceptually map on to the variables. They are subscales of a larger measure developed by Mearns, Rundmo, Flin, Gordon and Fleming (2004) which contained other relevant subscales also included in this thesis. Therefore measuring these variables with these scales was preferable to not measuring the scales at all within this thesis. Caution should be extended to these subscales and reliability analyses will be run on the data for this thesis to consider their appropriateness.

6.5 Measures of Shared Sacrifices

This category was the hardest category to operationalise from the conceptual model. When mapping this to the findings of study one, the category needed to be considered in the context of its peripheral categories in order to align psychological theories to them. First, the spillover between work and home was identified within the category of study one. Within the existing literature there was a good resonance with the participants' data examining the home-work interface. The search within this area of theoretical research yielded nine possibilities for appropriate scales. As with risk, most of these scales were being considered on the basis that they were currently designed to be administered to the employee (the firefighter). The

researcher considered if they could be adapted to measure relatives' perceived spillover of the firefighter's work.

Work-Family Conflict

The scale suggested in Carlson, Kacmar, Wayne and Grzywacz (2006) was appropriate to operationalise the conceptual category; however, this contained a number of items for the individual who is managing the home–work interface; the focus, therefore, would be on the firefighter. Natemeyer, Boles and McMurrian (1996) was also considered based on the conceptual overlap. However, this multidimensional scale used single-items to measure some constructs. There is evidence (Furr, 2011) to suggest multidimensional scales which use single items to measure constructs within a scale could possibly include random measurement error, therefore not eliciting a reliable or valid measure of the construct. In addition, this scale included items for on-the-job completion so this was not practical to use in the context of this thesis.

This scale did offer valuable conceptual distinctions between work family conflict and family work conflict; the literature mainly treats these as two different expressions of one concept, defining it conceptually as a bi-directional relationship (see Braunstein-Bercovitz, Frish-Bursteina and Benjamin, 2012 for example). This suggests it is a bi-directional relationship of conceptually distinct sources. This was further developed by the scale developed by Wayne, Musisca and Fleeson (2004) who also suggest that positive and negative spillover are conceptually separate concepts, rather than being poles at the end of one spectrum, but their concept was limited to the measurement of the employee, so this was also rejected.

The scale published by Hanson, Hammer and Cotton (2006) focussed only on positive spillover, not negative spillover. They also focussed on spillover from work to the family and also from the family to work. However, the wording of the items was about the transition from each domain to the other and therefore it was inappropriate to use due to the limited awareness the relatives have about the firefighter's spillover from home to work. This was also the reason to reject the scale by Mesmer-Magnus and Viewesvaran (2005), as the families are not able to report family to work conflict. Therefore, the direction of the spillover became a filter criterion within the literature searching.

The scale published by Frone, Russell and Cooper (1992) was rejected on a conceptual basis, it measures work to home conflict by focussing on tasks within each domain (the domain of work and the domain of home). However, when looking at the conceptual model from study one and the category of shared sacrifices, the participants do not discuss the work–home interface as tasks, they discuss it by conceptualising it as resources and energy, not tasks. On that basis, and also the bias that the measure was only looking for negative spillover, it was rejected.

Matthews, Conger and Wickrama (1996) used one item to measure work to family spillover, which conceptually mapped onto the categories from study one; however, the authors also used comparisons between the responses of the employee (the firefighter in this study) and the spouse (the relative in this study). Therefore, due to the involvement of the firefighter and, because it was limited to spouses only, it was rejected. The limitation to spouses only was also the reason to reject the scale by Matthews, Del Priore, Acitelli and Barnes-Farrell (2006). This thesis stipulated a wide inclusion and limited exclusion criteria and so exclusion of relationships other than spouses was not fitting.

The process elicited approximately five possible measures for consideration (Stevens, Kiger and Riley, 2006; Demerouti, Bakker and Butlers, 2004; Netemayer, Boles, McMurrian, 1996; Wagena and Geurts, 2000; and Kopelman, Greenhaus and Connoly, 1983). Following an evaluation of their psychometric properties, two scales remained (Stevens, Kiger and Riley, 2006; Wagena and Geurts, 2000) and permissions were sought. Unfortunately, only Stevens, Kiger and Riley (2006) gave permission. The scale published by Stevens et al. (2006) was adapted from the items used by Kirchmeyer (1992; 1993). This six item measure was included in study two. High scores indicate high levels of perception of partner's work-to-family spillover. The questions include 'My *firefighter's* job keeps *them* from spending time with *me*', 'Our relationship suffers because of *their* work', 'My *firefighter's* job makes it difficult for *us* to enjoy *our* free time outside of work', 'The amount of time *my firefighter* spends working interferes with how much free time *they* have', 'My *firefighter's* job makes it difficult for *them* to get household chores done' and 'My *firefighter* spends so much time working that *they* are unable to get much done at home'.

The five point Likert response ranges from 'Agree' to 'Disagree'. Scores were computed through summing the Likert selections of participants. In the original study this demonstrated a reliability alpha of 0.92 for women and 0.88 for men, but considering the words have been altered this should be revisited within this thesis.

Family Functioning

Family processes/functioning was a conceptual category identified within study one. When consulting the literature it was apparent that there is a wealth of scales and measures available to explore family functioning (for a reasonably comprehensive review, see Sawin and Harrigan, 1995); however, very few of these sit within, or are linked to a theoretical model. The Family Environment Scale by Moos and Moos (1981) has the capability to measure family functioning (from the perspective of one member of that family) in three different ways; the 'real', as that member perceives it to be now, the 'ideal', as that member would like it to be in an ideal world, and the 'expected', how that member predicts it would be in a new situation. The scale was developed to measure the family environment as modelled by Moos and Moos (1976) providing a theoretical model which it sits within.

The Family Adaptability and Cohesion Evaluation Scale (FACES) IV by Olsen, Gorall and Tiesel (2009) sits within the Circumplex Model of Family Functioning (Olsen, Sprenkle and Russell, 1979). The scale uses six subscales to assess and chart the level of cohesion and flexibility within the family which are the two main areas within this theoretical model. However, this scale has been heavily criticised throughout the literature for measuring inconsistently across studies (Sawin and Harrigan, 1995); this inconsistency has been attributed to the theoretical structure the scale sits within. The Circumplex Model of Family Functioning has, at its core, the suggestion that family functioning operates within a curvilinear model; suggesting that families mapped at either end of the curvilinear model are dysfunctional or, in some way, abnormal, and those scoring in the middle can be assumed to have a level of functioning within the 'normal' range. Researchers such as Tutty (1995) have criticised the measure as there is evidence that the FACES IV measures a linear relationship of family functioning. These difficulties with the model suggesting a curvilinear relationship and the scale measuring a linear relationship meant the scale was rejected.

The McMaster Family Assessment Device by Epstein, Baldwin and Bishop (1983) assesses families within the McMaster Model of family functioning. The General Functioning Subscale of this measure has been established as a useful tool to measure family functioning independent of the full scale (Georgiades, Boyle, Jenkins, Sanford and Lipman, 2008). This 12 item measure assesses: problem solving, communication, roles, affective responsiveness, affective involvement, and behavioural control using a four point Likert response. Although the full 60 item scale covers all of these subscales in detail, there would be a cost to participant burnout. Therefore the shorter 12 item version was selected instead which encompasses the subscales as separate questions. Although initially designed as a summary subscale for practitioner/clinician quick reference use, these 12 items are not just a subscale. Research (Miller, Epstein, Bishop and Keitner, 1985; Georgiades, Boyle, Jenkins and Sanford, 2008) has evaluated the 12 item measure and concluded it is psychometrically robust enough to be acceptable for use as a general measure of family health, pathology and functioning.

The Moos and Moos 90 item scale is under licence to Mind Garden and can be bought per item, per administration. As this thesis would involve the administration of this scale twice (see the FRS Family measure selection for more information on the second administration) the expense and length was prohibitive. This was deemed too great a cost to completion and response rates considering the potential for participant exhaustion. Therefore based upon this rationale, the Moos and Moos Family Environment Scale was rejected and the McMaster scale was selected. The McMaster scale was considerably shorter, but also contained a 12 item subscale measuring General Functioning. This subscale took items that were loading on to other subscales and combined them (attending to the psychometric evaluations and best practice) in order to create a valid and reliable measure of general family functioning as perceived by the

respondent. The internal reliability consistency has been reported as 0.89, with cut-off scores for 'healthy and 'unhealthy' families guided by Miller, Epstein, Bishop and Keitner (1985). These were developed using admitted patients of psychiatric hospitals and their families compared with patients diagnosed with a lung complaint and their families.

Sacrifices

Within the category of sacrifices, participants' data discussed the positive aspects of the sacrifices that families were forced or expected to make for the FRS. This included the ability to dual-parent through the shift system; this would be problematic to measure without the contribution of children. Data collection via an online survey failed to suitably map against theoretical sources. However, the participants' data and words were taken in order to create one-item measures of these benefits and costs.

Therefore a researcher-designed own section was created and excerpts from study one were adapted to be included as items with a five point Likert response ranging from 'Strongly Agree' to 'Strongly Disagree'. The scale points were labelled (as opposed to only the extreme anchor points) and a five point Likert response scale was developed in accordance with experimental research in to response behaviour (Weijtersa, Cabooterb and Schillewaert, 2010). This ensured the avoidance of negative reactions which were originally ambivalent, a higher completion rate and increased measurement accuracy.

Eight items were included: 'The Fire and Rescue Service is more than just a job, it is a way of life', 'The shift system my firefighter is currently on means I can't have regular activities', 'The shift system my firefighter is currently on means the family sometimes miss out on things', 'The shift system my firefighter is currently on means that my firefighter spends more time with our family', 'The shift system my firefighter is currently on means that my firefighter is closer emotionally to our family', 'The family is as much a part of the Fire and Rescue Service as their firefighter as they make a lot of the sacrifices', 'Fire Service events are important because as well as being social, the family benefits from speaking to other people who have similar issues', 'Families of firefighters live their lives in the service and therefore can expect a level of help and support back'. These were selected in accordance with Steiner (1993) item development checklist. These items were developed from the research findings of study one, through participant responses. The initial pool was reduced after considering the endorsement frequency (likely scoring in one direction) and the remaining items were then used.

Responses suggest that the higher the score, the less sacrifices the relative perceives their family have to make due to the work and employment of the FRS. Scores were computed by summing the score for each item. This is not a validated measure, and was designed by the participants' data from study one, however it is the only measure to assess the unique

pressures and context of the firefighter's occupation. This scale will be referred to as the Sacrifices Scale within this thesis.

Well-Being

Through the above process it was also considered that the positive occupational consequences of FRS work on adult relatives of firefighters should be captured. Working within the context of resource caravans (Hobfoll, 2011), the psychological well-being of relatives would in turn support the family and the firefighter. In relation to the wider theoretical model of well-being the scale which measures both psychological and subjective well-being, is the Warwick-Edinburgh Mental Well-being Scale (WEMWBS; Tennant et al., 2006). It has been evidenced to be sound cross-culturally (Taggart, Friede, Weich, Clarke, Johnson and Stewart-Brown, 2013; Stewart-Brown, Tennant, Tennant, Platt, Parkinson and Weich, 2009; Lloyd and Devine, 2012) and is suitable for establishing group level inferences despite smaller sample sizes (Maheswaran, Weich, Powell and Stewart-Brown, 2012). This 14 item measure has a five point Likert response ranging from 'None of the time' to 'All of the time'. Higher scores suggest more positive feelings of well-being. Indicative items include 'I've been feeling optimistic about the future', 'I've been feeling useful', 'I've been feeling relaxed', 'I've been feeling interested in other people', 'I've had energy to spare', 'I've been dealing with problems well', 'I've been thinking clearly', 'I've been feeling good about myself', 'I've been feeling close to other people', 'I've been feeling confident', 'I've been able to make up my own mind about things', 'I've been feeling loved', 'I've been interested in new things', 'I've been feeling cheerful'. All items are scored positively and a total score is computed by summing the response to each item. The WEMWBS has a Cronbach's Alpha of 0.92 (Tennant et al., 2006) this was validated on a student and representative population sample.

Personal Growth

Personal growth has a sound and rigorous theoretical model found within a wider psychological well-being model developed by Ryff (1995). Selecting a scale embedded within a theoretical model would ensure integrity and grounding of the approach. For this reason, some of the other psychological well-being scales were rejected (such as the Perceived Well-Being Scale – Revised scale published by Reker and Wong, 1984). Their lack of theoretical model indicated a scale had been developed from wider literature without a hypothetical structure for guidance.

The personal growth subscale was reviewed. The subscale of personal growth contains 14 items. Indicative items include: 'I am not interested in activities that will expand my horizons', 'In general, I feel that I continue to learn more about myself as time goes by', 'I am the kind of person who likes to give new things a try', 'I don't want to try new ways of doing things--my life is fine the way it is', 'I think it is important to have new experiences that challenge how you think about yourself and the world', 'When I think about it, I haven't really improved much as a person over the years', 'In my view, people of every age are able to continue growing and developing'.

Responses are on a six point Likert ranging from 'Strongly Disagree' to 'Strongly Agree'. A high score indicates feelings of continued development, improvement and self-growth. Six items need to be reverse scored and the scores for each item are summed to score the measure overall per participant. The internal consistency coefficient alpha was 0.85 (Ryff, 1995). The published work relating to personal growth (Ryff, 1989) suggests that there are no specific cut off scores for this subscale. Instead the author suggests that each sample is used to determine high or low well-being for those participants using the 25% and 75% quartiles.

6.6 Measures of the FRS Family

This category, derived from the theory generation in study one, was the membership and supportive structure of the Fire and Rescue Service community. The membership of this peer support network was clearly defined by the participants in study one; the immediate colleagues of their firefighter, the spouses and children of those colleagues and their immediate line manager and their family (up to station officer).

When consulting the psychological literature, the construct of non-kin families or fictive families was used to filter the published literature. The term 'non-kin' family generated some theory and measures but these mostly depended heavily on social support measures. When re-visiting the data from study one, it became apparent that social support was not the only function that the FRS Family was providing for relatives of FRS personnel. Therefore the measure of families or functioning groups was considered and family measures not appropriate to apply to a non-kin family were rejected. It became apparent when comparing between these measures and the measure of General Family Functioning from the McMaster Family Assessment Device, that this could also be applied not only to measure the family functioning, but also to the functioning of the FRS Family. When considering the questions, they were flexible to be appropriate for this situation: 'planning family activities is difficult because we misunderstand each other', 'in times of crisis we can turn to each other for support', 'we cannot talk to each other about the sadness we feel', 'individuals are accepted for what they are', 'we avoid discussing our fears and concerns', 'we can express feelings to each other', 'there are lots of bad feelings in the family', 'we feel accepted for what we are', 'making decisions is a problem for our family', 'we are able to make decisions about how to solve problems', 'we don't get along well together', 'we confide in each other'.

In order for this measure to work in the context of this thesis, the participants were asked to 'Please answer those questions again, but this time instead of thinking about your family, please think about your FRS family. This has been defined as your partner's immediate work colleagues and their immediate manager, their partners and children'. The 12 item measure used a four point Likert scale in order to measure the level of health and functioning of this family group. For psychometric properties please see the previous discussion in relation to the family measure.

6.7 Measures of Living with Traumatic Reactions

Secondary Trauma

When consulting the literature to assess the constructs within the conceptual model from study one, the literature yielded measures of post-traumatic and peri-traumatic stress symptoms, trauma measures, vicarious trauma measures and scales to assess traumatic stress and symptoms. As discussed previously in the literature review, it is clear that these constructs do not map on to the constructs identified from study one. When looking at the data from participants there was concern for their firefighter's reactions, but there was no discussion about their own reactions to events in their firefighter's work. The literature focussed on either spouses and children of Vietnam veterans, or the spouses and children of the firefighters' who attended and survived the World Trade Center incident on September 11th 2001. As previously outlined in the literature review, caution should be used when interpreting this research due to the uniqueness of an event such as the World Trade Center in 2001, and there are similarities and lessons that can be extrapolated across from the combat literature, but the anchor events are different in nature that this should also be completed with caution.

In addition to this, the issue with using any of the traditional measures of traumatic stress is that the measure is anchored to the individual who is exposed to the event, and the relatives of fire personnel were not at those events. However, the literature review suggested a few different possibilities to operationalise this part of the model: secondary traumatic reactions; vicarious traumatic reactions; emotional contagion and emotional reactivity. Through the review of the literature relating to vicarious trauma, this has been discounted for theoretical reasons (please see chapter three, section 3.15 for a literature review informed discussion and rationale).

After a review of possible measures it became obvious that conceptually the Secondary Traumatic Stress Scale (Motta et al., 1999) mapped onto the traumatic reactions which could be defined as secondary traumatic reactions.

This 22 item scale asks respondents to 'Consider a negative experience or experiences that happened to someone close to you. The person could be a family member, close friend, or anyone else with whom you have had a close relationship'. Participants complete a brief description of the event which they are thinking of the nature of the relationship between them and that person of which they are thinking. During piloting it was established that a steer was needed in order for the respondents to consider any negative experiences which their firefighter has had. Otherwise, without this steer they were thinking of friends and family unrelated to the study. As previously discussed, it is important in trauma work to be clear of the event the responses are anchored to. If respondents were answering with complete freedom then there would be some argument that the responses could not be treated homogenously and the usefulness of this construct would become limited within this thesis. Therefore the changes

were as follows: 'Please consider a negative experience or experiences that have happened to your firefighter whilst at work and answer the questions below about that experience(s).'

The questions that followed were answered on a five point Likert scale from 'Rarely/Never' to 'Very Often'. Questions ask about the symptomology of secondary traumatic reactions in order to try and establish how often they are experienced. The higher the score for this scale, the higher the reports of the symptomology of secondary traumatic reactions. Questions included: 'I find myself avoiding certain activities or situations because they remind me of their problems', 'I experience troubling dreams similar to their problems', 'I am losing sleep over thoughts of their experiences'. The total score is then computed by summing the item responses.

All items are positively scored. The Secondary Traumatic Stress Scale measures secondary trauma with an overall score, as well as its three subscale scores of intrusion, avoidance, and arousal. The reliability coefficient for the overall measure was 0.94, 0.83 for intrusion, 0.89 for avoidance, and 0.85 for arousal using adults from a social work occupation (Bride, Robinson, Yegidis, & Figley, 2004).

In order to try and ascertain what types of traumatic reactions were being discussed within the category of 'living with traumatic reactions' by participants in study one, emotional contagion was included. The content of that category could be operationalised as secondary trauma, emotional contagion or empathy; the phenomena could have been captured by either of these descriptions within the literatures. Therefore it was included in study two in order to see which operational measure fitted the data best to explain the phenomena. Once emotional contagion had been conceptually identified within the literature review, a search was completed for appropriate scales. This was also informed through the same psychometric examination review criteria were applied as have been reported elsewhere in this chapter.

Emotional Contagion

The Emotional Contagion Scale (Hatfield, Cacioppo and Rapson, 1994) is an 18 item scale which measures feelings and behaviours in various situations to see how susceptible people are to "catching" emotions from others. Items include 'if someone I'm talking with begins to cry, I get teary-eyed', 'it irritates me to be around angry people'. The response scale is a five point Likert scale from 'Always = Always true for me' through to 'Never = Never true for me'. Items one, eight, fourteen and sixteen are reverse-scored. The higher the score the more susceptible to emotional contagion the participant is. In its original form, the scale has a Cronbach's Alpha of 0.90 (Doherty, 1997) based on populations of students, physicians and marines in Hawaii.

Resilience

The last factor to be included in the questionnaire pack was a scale to measure resilience within the participant sample. The Resilience Scale for Adults, 33 items (Friborg, Barlaug,

Martinussen, Rosenvinge and Hjemdal, 2005) mapped to the same criteria of selection and consideration as has been described previously. The 33 items measure resilience through six subscales; Perception of self, Planned future, Structured style, Social competence, Family cohesion and Social resources. The response items were positioned on a five point Likert scale with specific poles to each question. Items included: 'My judgements and decisions' which had the poles 'I often doubt' to 'I trust completely' at either side of the five point Likert response. These pole descriptors change for each item in turn. The internal consistency ranged from 0.76 to 0.87 (Friborg, Barlaug, Martinussen, Rosenvinge and Hjemdal, 2005). The published work was completed on a sample of 482 applicants (not yet accepted) to a military college. Friborg et al. acknowledge that whilst this may reduce the generalisability of the sample descriptors, they advocate that these should be able to be 'reproduced well' in other samples. The rationale for their sample selection was to increase the robustness of the tests of the factor structure; ensuring it could be tested through a different sample base.

Discounting the Conservation of Resource Evaluation Scale

As detailed in chapter three, section 3.27, the Conservation of Resource theory has strong theoretical support however the measurement of the theoretical framework is yet to be established. The Conservation of Resource Evaluation tool (Hobfoll, Lily and Jackson, 1992; Hobfoll and Lily, 1993), the measure has been mostly used post disaster response (for example, see Benight, Ironson, Klebe, Carver, Wynings, Burnett, Greenwood, Baum and Schneiderman, 1999). It has been adapted to use in interviews (Wissing and van Eden, 2002) and influenced the development of diary studies (van Gelderen, Heuven, van Veldhoven, Zeelenberg and Croon, 2007). Therefore, the framework of the theory will be used to align the other areas of research and theories, but will not be the outcome measure for studies two and three as a suitable measure is yet to be developed. Having reviewed the measure it would not access the nuances of how the resources are appraised, threatened or coped with and therefore does not conceptually fit with study one. Subsequently, for this thesis, the occupational resources and threats to relatives of firefighters will be measured using the scales identified previously in this chapter.

6.8. Pilot Study of Questionnaire Pack Construction

In order to test how these selected measures performed with the sample population, and as an overall questionnaire pack, a pilot study was completed. A demographics section was also inserted collecting demographic information about the participant, their firefighter, their family and their relationship (see appendix two and three).

6.9 Introduction to Pilot Study

During the stages of mapping between the conceptual categories from study one and operationalising these in study two, it became clear that the transfer between the two would not be simple. Therefore a sophisticated mapping technique (outlined previously in this chapter)

ensured concepts would be measured robustly and rigorously, without losing meaning or clarity. Initially, the questionnaire survey/pack was only guided by the nuances of the psychometric literature relating to such things as: positioning and placement of scales, scale structure, questionnaire pack structure, issues in the sophisticated nuances of reliability and validity (beyond the competent level of knowledge relating to correlations), debates surrounding response formats, response structure, layout, ordering. However, the piloting process aided to build and develop from informed theory to a realistic, relevant survey. An extended, in-depth piloting process was undertaken to ensure this had been achieved.

6.10 Method

Participants were asked to complete the online questionnaire pack to ensure that the experience, presentation, screen layout and response layout was all in accordance with how the data collection experience would be presented. Participants were asked however not to fill in the questionnaire but to note down anything they felt to be unclear, confusing, ill-signposted or anything they felt needed further consideration. They recorded these on paper which the researcher then used as feedback to improve the appearance and content of the questionnaire pack. The researcher also asked pilot participants to ensure they understood the information about ethics both before and after the survey itself.

6.11 Sampling Strategy

In order to ensure that the scales would be relevant for the wide range of participants within the potential participant pool, purposively selected participants were approached to take part in the pilot study. This sampling strategy was developed in order to test the survey pack in every situation possible to ensure the robustness of the questionnaire from the perspective of the participant, but also to ensure it was sensitive enough to capture the potentially subtle differences between participants. The sample was therefore representative of the situations in the table below:

Table 6.11.1 Purposive Sampling and Demographic Variables of Study One and Two

Shifts	Retained, Flexi-duty officer, Firefighter
Level of Management	Watch Manager, Senior Management Team, Area Manager
Status of Work	Retired, Still in service

The following sections detail how this was achieved.

6.12 Consideration of relatives

In order to consider the potential differences between the working practices of firefighters, a full purposive sample would be achieved. Consideration also needs to be given to the full range of

differences between the situations of relatives. Both sexes and a representative from most of the different relationships to their firefighter were included in the sample.

6.13 Consideration of country

In the following stages of this thesis the country where the firefighter and relative resides is needed to be captured in order to answer all of the research questions. Therefore the piloting needed to incorporate representatives from other English speaking countries to ensure that the language used would make sense to participants in countries outside the UK. This was achieved by asking colleagues in other countries who have previously worked with the researcher to test this out on their behalf. The academics were contacted and asked to take a copy of the final draft version (after the other piloting had been completed) to their local fire service contacts in order for relatives to check through the questionnaire pack and check for any misunderstood, alternate meaning words or phrases. They were also asked to ensure that the questions and items exploring shifts, working practices or culture were appropriate and still held meaning within that country. This was carried out in both the U.S.A. and also Canada.

6.14 Participants

Twenty five participants were purposively sampled to check the questionnaire pack was ready to be disseminated for the wider data collection process.

6.15 Procedure

An initial six participants were offered paper-based packs to enable them to annotate the pack. Participants were asked to consider certain aspects of the pack development. The remaining 19 participants were piloted online.

Piloting was carried out in a staged approach, so participants were asked to focus on specific aspects of survey pack development. This developed from focussing on consideration of relevance to relatives of firefighters and the firefighting occupation, the order of questionnaires as they appeared within the pack, the wording of the demographic questions and through to more generic feedback. The more generic feedback included question order, appearance, format, signposting, clarity and anything else they wanted to comment upon. This process enhanced the robustness of the pack as well as its sensitivity.

6.16 Feedback

Feedback from the participants can be seen in the table below:

Table 6.16.1 Comments from Pilot Study Participants

P. No.	Sex	Age	Relative status to ff	Comments
1	M	57	Son of retired ff	Specific aspects of questions were discussed as well as question order, appearance, format, signposting and clarity.
2	F	47	Daughter of retired ff	Made some specific suggestions about the order of items. Specific aspects of questions were discussed as well as appearance, format, signposting and clarity.
3	F	62	Wife if retired ff	Made comments on ordering. Recommended wording of demographics to apply to a retired situation. Debated wording of n/a vs 'do not want to answer' options. Highlighted missing options within specific questions.
4	M	42	Brother of ff	Removal of double questions in demographics. Development of more categories for options within specific questions. Suggestions for subheadings.
5	F	32	Wife of retained ff	Suggestions for the ethics information. Debated if the Secondary Trauma Scale moved to the 'about you' section or remained in the middle as per convention for a sensitive scale.
6	F	28	Partner of ff	Suggested ordering as per constituent group/focus of questions: generic, ff, FRS, generic. Highlighted an Americanism from a US scale ('shot' instead of 'injection').
7	F	60	Mother of ff	Comments on instructions on the scales – amend the overall 'knit' and signposting of the pack with a constant focussing on the FRS and the ff embedded within the signposting.
8	M	31	Brother of ff	More contextual information about me and the research. Suggested specific movement of item order. Did identify response patterns and negative scoring items – suggested to move/swap them. Spelling and grammar issues. Add civil partnership to demographic options in specific questions.
9	F	54	Wife of retired CFO	Move position of the text under each response as too off/detached from the responses (and other formatting issues). Should add in N/A as well as 'do not wish to answer'. Clarification on issues of meaning and sentiment of some items.
10	F	24	Wife of fulltime ff and daughter of retained ff	Suggested removing detail and length of survey. Identified question 11 as 'hit you in the face'. Demographics need to move options for her or should she just choose one of the relationships to based her replies on (both her father and husband are ffs)? Response format change notification should be a larger font size. Emphasise there are no right or wrong answers. 'Not sure' is not the same as 'I do not know' so suggestion to include them both in the response format. Suggestion to include more signposting to highlight the change in personal nature of questions.
11	M	23	Son of ff	Suggested to précis instructions of scales and links between (signposting).
12	F	31	Partner of area manager	Formatting, spelling and grammar suggestions. Suggested to write out response styles in full (not abbreviated) to ease comprehension.
13	F	30	Daughter	Spelling and grammar suggestions as well as formatting suggestions. Sort clarity

			of retired ff	and meaning on some response sets.
14	F	53	Daughter of retired ff, partner of ex-RAF ff	Detail checking and clarification, spelling and grammar, meaning of response Likert scales and meaning of abbreviations.
15	F	26	Partner of ff	Checked translation to the American culture. Suggested no alterations where necessary.
16	F	56	Wife of ff	Checked translation to the American culture. Suggested slight change to demographic roles as their culture holds a position of fire investigator. This was corrected for further piloting.
17	F	33	Wife of ff	Checked translation to the American culture. Suggested no alterations where necessary.
18	F	43	Wife of ff	Checked translation to the American culture. Suggested no alterations where necessary.
19	F	47	Partner of ff	Checked translation to the Australian culture. Suggested no alterations where necessary.
20	F	36	Wife of ff	Checked translation to the Australian culture. Suggested no alterations where necessary.
21	F	35	Wife of ff	Checked translation to the Canadian culture. Suggested no alterations where necessary.
22	F	42	Sister of ff	Checked translation to the Canadian culture. Suggested no alterations where necessary.
23	M	60	Father of ff	Checked translation to the Canadian culture. Suggested no alterations where necessary.
24	F	32	Partner of ff	Checked translation to the Canadian culture. Suggested no alterations where necessary.
25	F	46	Wife of ff	Checked translation to the Canadian culture. Suggested no alterations where necessary.

As can be seen from the table the piloting process was beneficial and facilitated changes within the survey pack itself, although the individual validated scales remained predominantly unchanged from the details in chapter four. The only exception to this was within the Emotional Contagion Scale (Hatfield, Cacioppo and Rapson, 1994) where the word 'shot' was replaced with the word 'injection'. Item number twelve in the scale reads 'I wince while observing someone flinching while getting a shot'. This was first highlighted by pilot participant six who did not understand the term and sought clarification. After this, a further eight participants highlighted this as a concern. After the change was made to read 'I wince while observing someone flinching while getting an injection' the international pilot participants did not comment on this terminology so it remained as 'injection'. This is simply an inherited issue as the scale

originated in the United States where this terminology/colloquialism for injection is used as commonplace. Where other specific aspects of the pack were discussed and commented upon by participants, their comments were evaluated and accommodated, if appropriate. If items were part of a validated questionnaire then careful consideration was given to the potential impact on the psychometric properties by any proposed changes. Regarding the overall performance of the survey document, this piloting process ensured it was consistent in approach, clear and easy to complete.

The ordering of the scales within the questionnaire pack were changed and moved through the process of piloting the pack (this was enabled due to the staged piloting process, instead of sending the pack out to all participants at once). The final format can be seen in appendix two. The suggestions of turning 'do not want to answer' to 'do not wish to answer' were immediately accepted in order to sound more courteous and polite. Participant three's view to add in N/A to denote not applicable as well as retaining the 'do not wish to answer' option was considered. This consideration was framed by one important criteria to meet throughout the process; to ensure clarity and retain as much simplicity as possible in order to improve the completion experience for participants. This in turn would hopefully decrease attrition throughout the completion of the survey. This debate also included the suggestion from participant ten that 'Not sure' is not the same as 'I do not know' and they therefore suggested including that as an option as well. However, after reviewing the literature on this aspect of psychometric research it was clear (Furr, 2011; Kulas, Stachowski, and Haynes, 2008) that adding in N/A would be sensible to achieve this criteria. However adding in 'I do not know' to complement 'Not sure' and 'Not Applicable' would actually cause confusion for participants and compromise the psychometric properties of the scale (O'Muircheartaigh, Krosnick and Helic, 2000). There would also be a cost to the participants in the length of time to comprehend the survey and to consider the options. Therefore this suggestion was not implemented.

In summary, the alterations were quite substantial from the first draft of the questionnaire pack. Alterations were mainly focussed on: signposting to participants, clarity of instruction, requests to move instructions from an American use of language and spelling to English norms, requests for questions to be moved, requests for instructions to highlight a change in the response style, suggestions for demographic information to be framed differently, suggestions for the inclusion of new aspects of demographic information (such as civil partnership), requests for full versions of response styles to be represented rather than an abbreviated version, spelling and grammar mistakes pointed out and corrected.

The full questionnaire pack contained 205 questions (discounting the unique identifier requests and the consent/submission requests) and 28 pages long. The Fire Fighters' Charity and the Chief Fire Officers' Association also reviewed the final questionnaire pack. Once the piloting

was completed, the link to study two in the online questionnaire software SurveyMonkey was distributed.

6.17 Conclusion to Chapter

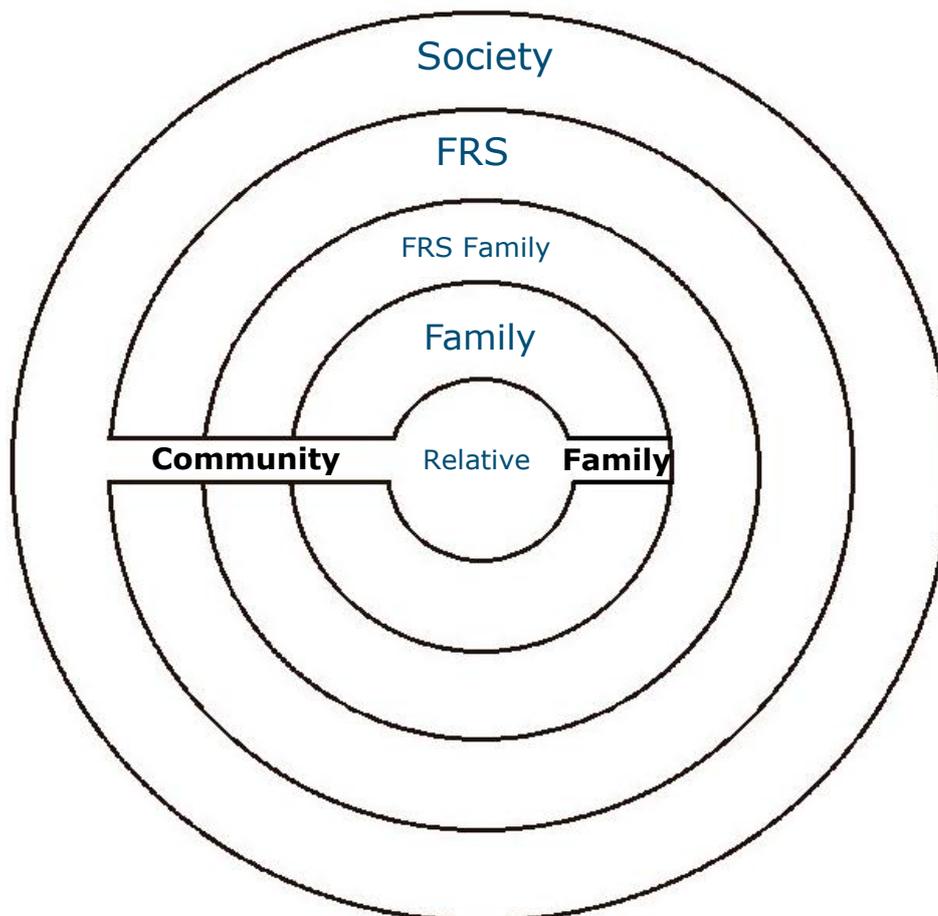
This chapter has discussed the debates and procedures considered when mapping the conceptual model developed through study one, to an operational model. This was completed to inform a robust process of scale selection and consequently, this thesis has established appropriate scales to measure the tiers of resources allowed the construction of both a macro (individual and kin-family) model of resilience and meso (family and organisational/society) model of well-being for relatives of firefighters. The next empirical chapter will use these scales to explore the model of resilience within relatives.

Chapter Seven: Study Two; Predictors of Resilience within Family Members

7.1 Introduction to Chapter

This chapter will test the resources identified in the model in study one (chapter five), particularly with reference to the relatives' responses to impacts at the macro level. This will identify the intrapersonal and family resources which relatives draw upon in order to respond to impacts from the firefighters' occupation. This can be seen in the Venn diagram below:

Figure 7.1.1 Venn Diagram of the COR Theory Tiers within this Thesis



In diagram 7.1.1 has been developed to illustrate how the tiers of resources are structured. This has used the structures identified from findings of study one. Therefore the FRS Family are the watch, their spouses and their children. The family is the kin family unit within which the relative and firefighter are situated. The emboldened 'family' and 'community' labels denote the circles of resources available in each tier. Study two will seek to examine the tiers of intrapersonal (relative) and family (kin) resources. Study three will seek to examine the socio-cultural structures of the FRS (relative, FRS family and the FRS).

This chapter will now explore study two. In chapter three the research debates presented on: family process (section 3.7, 3.9 and 3.14), perceived physical danger and fatalism (section 3.21, 3.22, 3.23), the transmission of emotions between the family members (section 3.14, 3.16,

3.17), personal growth (section 3.26) and the Conservation of Resource Theory (section 3.27) can be used to operationalise the model of individual and family resources. The collective reservoir of resources a family or group of people use to maintain their resilience can flow freely between members. This allows members to give resources to one individual if they are depleted and facilitates the absorption of impacts by all members rather than one individual. As this model is exploring the resources to maintain resilience at the macro level, this study will conceptually measure resource pooling (Hobfoll 1990; 2001; 2002; 2011; 2012) within macro structures by measuring the predictors of resilience:

Table 7.1.2 Typology of Variables Associated with Resilience in Study Two.

Family	Individual
Family Functioning	Personal Growth
	Emotional Contagion
	Perceived Physical Danger
	Attitudes to Safety
	Resilience

This study will give insight in to the research question (B3) what individual and family resources facilitate and maintain the resilience of relatives.

7.2 Method

In order to test the model the questionnaire pack was distributed to an international sample of relatives of firefighters. The selection criteria for participants were that they had to be a relative of a firefighter, and they had to have lived with them for at least six months when they were operational.

7.3 Recruitment of Participants

A social media strategy was designed to increase participation. It provided more information to firefighters to increase participation through firefighters as recruiters. A 'soft landing page' welcomed participants and outlined the aims and benefits of the research (<http://fireservicefamilies.com>). National and international firefighter organisations were targeted to disseminate to online communities with a fire-community focus. Alongside this, the researcher completed a press release to local papers and fire-related publications across the UK resulting in press coverage and a radio interview for BBC Radio Nottingham.

To compliment these activities the research details and invitation to participate were also sent to the Fire Fighters Charity, the researcher's professional network, the Chief Fire Officer's Association, the Fire Brigades Union and the International Association of Fire Fighters which is the United States and Canada union of fire fighters. The researcher also wrote to every Chief Fire Officer in England, Scotland and Wales requesting them to put the information on their

intranet sites, and wrote to all Fire and Rescue Service trade magazines/journals and twelve firefighter-related forums to publicise the research information.

7.4 Participants

The sample was restricted using inclusion criteria, specifying that the participants had to have lived with a serving firefighter for at least six months. Participants were aged between 21 and 69 years of age, with a mean of 43.2 (13.5), 49 participants were female and 12 male. The mean years lived with a firefighter for this sample was 18.4 (std. 11.2), contracted to a mean of 29.6 hours per week, works a mean of 35.5 (23.9) hours per week (average regardless of contract). They have a mean of 1.5 children which have a mean age of 17 (12.6). Their relationships to their firefighters are as follows: 46 Spouses, 7 Parents, 5 Children, 3 Siblings. The participants had known their firefighter for a mean of 24 (14.8) years. Table 7.4.1 provides information regarding the relationship status of participants' to their firefighter.

Table 7.4.1: Relationship Status

Relationship	Frequency
Married	53
Single	2
Cohabiting	3
Civil Partner	1
Separated	1
Missing	1
Total	61

The firefighters had a mean length of service of 22 (10.8) years. Their mean age was 43.3 years old (16.4), they work a mean 49.9 (25.1) hours per week (average regardless of contract) and have a mean of 1.9 (1.2) children with a mean age of 16.8 (14.3) years. The sex of the firefighters were 57 males and 4 females. The table 7.4.2 below describes their working status within the FRS:

Table 7.4.2: Firefighter's Working Status for Study Two

Is/was your firefighter	Employed full time basis	Volunteer full time basis	Volunteer part time basis	Employed part time	Firefighter level	Junior Manager level	Middle Manager level	Senior Manager level	Retired	Medically Retired	Still Working
N	48	11	3	4	26	13	7	17	14	1	46
Total	66				63				61		

7.5 Analysis of Data

Once the data was collected a process of cleaning, testing and analysing was conducted.

7.6 Data Cleaning Process

7.7 Deleting Cases

The total number of cases that had been established in the data collection process was 245 however this was reduced to 178 after all cases without a unique identifier were removed; most of these also had cases with less than 90% of data resulting in n= 111. After removing cases with over 20% of data missing this dropped to 61 cases (24.9% of the original responses). Q104 had the peak attrition rate which was the question immediately following the statement 'You are now just over HALF WAY THROUGH the questionnaire, thank you for your commitment. In this next half of the questionnaire please could you tell me a little bit about yourself?'. It is therefore assumed that survey fatigue caused participants to navigate from the research.

7.8 Alterations to Variables

The items asking for the ages of children or adults within the household (q0016, q0201, q0205 and q0207) were replaced with the mean score of each cell to convert to scale data.

The following variables were also converted to scale data (q0005, q0009, q0010, q0014, q0015, q0193, q0194, q0199, q0200, q0202, q0203, q0204, q0206). These items were originally string items such as 'how many hours, on average, do you think your firefighter works per week (irrespective of their contracted hours)?'. Participants had then used that space to describe their firefighter's working week in detail. The researcher then extracted a mean number of hours worked per week from the information provided to convert this to scale data.

7.9 Missing Value Analysis

The 'do not wish to answer' options were all coded as missing within the analysis.

Categorical errors were checked for using the frequency function of SPSS. Two errors were noted through looking for outliers. The first was a participant who stated 35 people lived in their household, however only three ages were provided for the ages of the household so the 5 had been entered in error and the 35 was changed a 3.

The second outlier was identified through the scale data error check. This was also completed through the frequency function. Item 0010 of 'How many hours, on average, do you think your firefighter works per week (irrespective of their contracted hours)?' a genuine outlier of 169 hours was altered as they had indicated through other questions that their firefighter worked full time, and through free text responses they suggested that they felt their firefighter was on duty twenty four hours a day and seven days a week. However, keeping this outlier would distort the

analysis. In line with Tabbernick and Fiddell (2014), the researcher made an informed decision to replace the 169 with 48 as this is the full time hours that firefighters are usually expected to work.

A missing values analysis was then completed. When exploring the missing values, imputation was used to explore the patterns of missing values. A cut-off of 0.01% was used so that all missing values could be considered. All were within acceptable levels as can be seen in the table below. The table below presents the analysis of missing values for variables in study two.

Table 7.9.1: Analysis of Missing Values for Variables in Study 2.

Construct Measured	Of the variables, how many have at least 1 missing value	Of all 61 cases, how many contain at least 1 missing value	Of the total sum of values, how many of the values are missing	Comments
Perceived Physical Danger	1 (20%)	1 (1.639%)	1 (0.328%)	Acceptable
Attitudes to Safety	0 (0%)	0 (0%)	0 (0%)	Acceptable
Emotional Contagion	8 (44.44%)	7 (11.48%)	10 (0.911%)	Acceptable
Resilience	33 (100%)	3 (21.31%)	49 (2.434%)	Acceptable
Personal Growth	14 (100%)	7 (11.48%)	22 (2.576%)	Acceptable
Family Functioning	2 (16.67%)	3 (4.918%)	3 (0.410%)	Acceptable

Missing values across variables and participants were then replaced by the item mean of the subscale (Streiner, 2002). In the assessment of single missing values (Tabachnick and Fidell, 2014), the patterns of missing data analysis suggested that they were missing completely at random. The item mean method warrants careful deliberation as there is a possibility of reduced variance as a negative outcome. This is through a reduction within the calculation of the standard deviation, resulting in a narrowing of confidence intervals. This could potentially distort

the analysis; however this should be negligible due to the small number of replacements needed. The proportion of missing values at this stage was exceedingly small and the mean substitution does enable a conservative approximation. Therefore this was appropriate to complete.

7.10 Normality

An assessment of normality was performed through exploring the descriptive statistics. This was performed on the totals of the scale items, it concluded that all data was within normal bounds. Descriptives, Extreme values, Tests of normality (Kolmogorov-Smirnov and Shapiro-Wilk), Histograms, Normal Q-Q Plots, Detrended Normal Q-Q Plots and Boxplots were examined for every scale. Through the 5% trimmed mean analysis it was concluded that all outliers had been considered and adequately addressed. Descriptive and inferential analysis could continue with an acceptable level of confidence.

7.11 Descriptive Analysis of Data

In the first instance, descriptive exploration of the data was conducted before inferential statistical analysis was conducted.

7.12 Assessing the sample through descriptive statistics

The data were then explored using descriptive statistical analysis. The means for each scale were examined to establish scores of the sample. The table below shows the descriptive statistics for the scales used in study two.

Table 7.12.1 Scale Means for Variables in Study Two

	N	Mean	Std. Deviation
Resilience	54	4.0140	.45364
Family Functioning	60	1.6556	.47747
Growth	58	4.9002	.71340
Emotional Contagion	60	2.5676	.22874
Perceived Physical Danger	59	4.0136	.66630
Attitudes to Safety Scale	60	3.2000	.63460

The overall mean for the resilience scale is 4.01; however, the published work examines the meaning of measurement through six subscales. The means and standard deviations are reported below alongside the published means and standard deviations of the original research by Friberg, Barlaug, Martinussen, Rosenvinge and Hjemdal (2005). These figures should be interpreted where a higher score means more protection from psychological harm, in other words, increased psychological resilience.

Table 7.12.2: Means and Standard Deviations for the Adult Resilience Scale

	Current study		Published work	
	Mean	Std Dev	Mean	Std Dev
Perception of Self	3.60	0.51	4.28	0.44
Perception of Future	3.83	0.98	4.24	0.56
Social Competence	4.41	1.12	4.22	0.53
Structured Style	3.80	0.90	3.90	0.62
Family Cohesion	4.17	0.71	4.29	0.58
Social Resources	4.42	0.59	4.66	0.35
Overall	4.01	0.45	5.11	0.68

The means and standard deviations of perception of self and perception of future within this study are slightly lower and larger than the published work. This suggests that the participants within this study have decreased psychological protection in these two areas. These two areas are part of four factors which measure internal resilience (alongside social competence and structured style). The other two factors measure external resilience (family cohesion and social competence). On initial inspection, the other means and standard deviations measuring resilience factors are similar to the published descriptive data.

The means and standard deviations measuring family functioning were compared with the McMaster Family Assessment Device (FAD) between this sample and the published cut off scores (Miller, Epstein, Bishop and Keitner, 1985). These scores indicate healthy and unhealthy family scores. As this study used the 12 item subscale of General Functioning, those means and standard deviations will be reviewed in the table below.

Table 7.12.3: Means and Standard Deviations of the FAD General Functioning Subscale

	Current Study	Published work	
		Healthy Family	Unhealthy Family
Mean	1.65	2.03	2.36
Std Dev	0.47	0.55	0.56

Scores on the General Functioning subscale of the FAD measures the six areas of functioning which the full FAD measures. These six areas of functioning are problem solving, communication, roles, affective responsiveness, affective involvement and behaviour control. These means should be contextualised in the reference that the higher the mean score, the greater endorsement of unhealthy items rather than healthy items. So a lower mean would indicate that the family have fewer challenges within their six realms of functioning. The mean for the participants in this study indicate that it is well below the cut off for an unhealthy family and instead sits within the threshold of a healthy family. This infers that on balance; most of the families taking part within this study have few challenges problem solving, communicating, being effective in their family roles, in their responsiveness to each other, their involvement with each other and controlling their behaviour. All suggesting that the families are mostly functioning well.

The published work relating to personal growth (Ryff, 1989) suggests that there are no specific cut off scores for this subscale. Instead the author suggests that each sample is used to determine high or low well-being for those participants using the 25% and 75% quartiles. For this study there are 12 cases above the 25% quartile and 13 cases below the 75% quartile with the remaining 35 cases between the two. High scores according to Ryff, on the scale of personal growth have feelings of continued development, defining them self as growing and expanding, are open to new experiences, have a sense of realising their potential, sees improvement in themselves and their behaviour over time and is changing in ways that reflect more self-knowledge and effectiveness. Ryff defines low scorers as having a sense of personal stagnation, lacking a sense of improvement or expansion over time, feels bored and uninterested with life and feels unable to develop new attitudes or behaviours. This infers that all levels of Personal Growth are represented within the sample.

The means and standard deviations for emotional contagion can be reviewed in the table below. With published values from Hatfield, Cacioppo and Rapson (1994) and Stockert (1993).

Table 7.12.4: Means and Standard Deviations for Emotional Contagion Subscales

	Current Study		Published Literature	
	Mean	Std Dev	Mean	Std Dev
Fear	8.60	2.00	7.92	1.89
Anger	8.21	1.63	6.84	1.34
Sadness	8.81	1.38	7.59	1.40
Joy	5.11	1.29	10.04	1.19
Love	5.03	1.57	10.30	1.31
General	5.61	1.47	9.58	2.50

As can be seen from the table the means between the current study and published work for the first, more negative three subscales (fear, anger, sadness) are similar as are the standard deviations. The means for the last three subscales of joy, love and general are quite different to the published means. This indicates less susceptibility/more resistance within this sample to emotional contagion of positive emotions than those of the published literature, despite a relatively equal susceptibility of negative emotions. The general measure is an assessment of general susceptibility to emotional contagion.

Within the scale of attitudes to safety, the mean for fatalism was 3.65 (SD 0.81) for this study. The published work of Mearns et al (2004) does not provide means or standard deviations for this subscale. The mean for belief in own safety behaviour was 2.52 (SD 0.74). In order to keep a consistent approach within the research programme, the sample data distribution would be used to assess higher or lower scores for attitudes to safety, this explores participant's views of the nature of safety. A lower score indicates a belief that fate, processes and other's behaviour dictates the probability of accidents, whereas higher scores indicate they rely on their firefighter to detect and respond to threats to their physical safety at work. There were 12 participants above 25% percentile suggesting they have endorsed more items aligning to a position that safety is in the control of their firefighter rather than environmental factors. Conversely only 9 participants' scores fell below the 75% percentile indicating their belief that the nature of safety is frequently outside of their firefighter's immediate control.

The mean for this study for the Perceived Physical Danger scale was 4.01 (SD 0.66). The published work of Jermier, Gaines and McIntosh (1989) indicate a mean of 8.84 (SD 4.02) for their sample. The lower mean of this study indicates that this sample perceives less threats of global physical danger to their firefighter. Jermier et al qualify global physical danger as a perception of likelihood of disability or accidental death whilst their firefighter is at work. The lower perception of likelihood of this sample could be attributed to the length of service of the firefighters as Jermier et al. link perception of physical harm to accidental and incremental or delayed harm. If there is a concept within this scale which does tap in to the longevity of risk of

physical injury then it would seem reasonable that the longer the firefighter has been in service, the lower the perceived risk of harm. However this does not stand up when a correlation is performed between these data in this sample. Only a positive, very weak, non-significant correlation is yielded.

7.13 Evaluation of Reliability of Scales and Subscales

The reliability scores were also checked for each subscale/scale. For the Perceived Physical Danger the subscale of physical danger Jermier, Gaines and McIntosh (1989) has good internal consistency with a Cronbach alpha coefficient of 0.95, mean of 8.84 (4.02). For this study the Cronbach alpha coefficient is 0.93, mean 11.51 (3.21). For the additional researcher adapted questions the Cronbach alpha coefficient for the current study is 0.83, mean 8.55 (1.29).

Within the measures of attitudes to safety, the Cronbach alpha coefficient for the Fatalism scale in the original study by Mearns et al (2004) was 0.49. The Cronbach alpha coefficient for this study is 0.60, mean 10.95 (2.43). The Cronbach alpha for Belief in own safety behaviour was 0.28, for this study it was 0.01, mean 5.05 (1.47), the low coefficient is most likely due to the low number of items (2), however the mean inter-item correlation value is also 0.01. This suggests there is not a strong relationship between these variables. Together the overall Cronbach's Alpha Coefficient for Attitudes to Safety scale was 0.54.

Emotional Contagion scale for the current study has a Cronbach alpha coefficient of 0.71, mean 42.01 (5.28). This coefficient indicates an acceptable level of internal consistency reliability for this population. The original study (Doherty, 1997) report a Cronbach coefficient of 0.90. It is worth bearing in mind that following feedback from the piloting process, an item within this scale was modified (see discussion within the pilot chapter). This may explain the difference between the coefficients (as well as the different sample). The higher the score the more susceptible the person is to emotional contagion. There are six subscales within this scale. The Cronbach coefficients for the current study can be seen in the table below.

Table 7.12.5: Cronbach Alpha Coefficients for the Subscales of the Emotional Contagion Scale

	Cronbach coefficient
Fear	.53
Anger	.25
Sadness	.24
Joy	.66
Love	.66
General	.81

Cronbach alpha coefficient for the Resilience scale within this study is suggested to be computed for each of the dimensions of resilience measured within the scale. The internal consistency ranged from 0.76 to 0.87 for published coefficients for the overall scale (Friborg, Barlaug, Martinussen, Rosenvinge and Hjemdal, 2005).

Table 7.12.6 Cronbach Alphas for the Current Study and Published Literature for the Resilience Scale

	Current Study	Published Literature
Perception of self	0.72	0.81
planned future	0.86	0.78
Structured style	0.71	0.75
Social competence	0.83	0.67
Family cohesion	0.81	0.79
Social resources	0.80	0.77

The Cronbach's alpha coefficient for the 14 item measure of personal growth is published by Ryff of 0.85, for this study it was 0.87, mean 68.60 (9.98). This is considered preferable as it is above 0.8.

For the Family Functioning Scale the Cronbach alpha coefficient for this study is 0.88 with a mean of 19.86 (5.7). This shows a preferable strength of relationships between items for this sample.

7.14 Correlations

Bivariate correlations were used to explore the relationships between variables and identified three statistically significant relationships. Attitudes to safety and Emotional Contagion have a weak positive correlation explaining 14.44% of the variance. This means that as the score for susceptibility to emotional contagion increases, the belief that accidents happen regardless of their firefighter's behaviour also increases.

Personal Growth has a large, moderate positive relationship with Resilience explaining 27.87% of the variance. Such that the more a person believes they are continually developing; so they have higher levels of resilience. This is to be expected as the two psychological constructs are closely aligned; both orientate towards positive psychology and the ability to manage one's own psychology. Therefore it is not surprising that they have a positive relationship.

The last statistically significant relationship is found between Resilience and Family Functioning. This is a negative moderate strength relationship, explaining 20.52% of the variance. Such that as the level of reported functioning decreases, the resilience diminishes suggesting that a family

which can communicate, problem solve and cope together are associated with more resilient individuals within that family.

7.15 Multivariate Analysis of Variance

A MANOVA was conducted based on previous literature (see chapter 3, sections 3.3 and 3.4) suggesting that working patterns and shift work might impact on the resources of relatives. Comparisons were completed between groups generated on demographic variables, namely the hours worked by the firefighter and the relative. The results for which can be found in the table below:

Table 7.15.1 Table Comparing MANOVA Box's Outputs for Study Two

	Variable	Wilk's Lambda	Significant?	Mean	St. Dev.
Working Patterns	Hours Worked by FF	.977	Non-significant	49.9	25.1
	Hours Worked by Relative	.764	Non-significant	35.5	23.9
Familiarity with FF's Role	Length of Service	.940	Non-significant	22	10.8
	Length of Time Lived with FF	.679	Significant	18.4	11.2
	Age of Participant	.941	Non-significant	43.2	13.5

7.16 MANOVA addressing differences in working patterns

In order to assess differences between hours worked by the firefighter and the relative, participants were categorised in to two levels for each independent variable.

Hours worked by the firefighter (the independent variable) and the relatives' levels of; resilience, personal growth, perceived physical danger, fatalism, emotional contagion and family functioning (the dependent variables) were used to complete a multivariate analysis of variance. The data were split based upon the mean hours worked by the firefighter. One group was generated below the threshold of 49 hours per week worked (n=28) and a second group were generated based upon working hours per week above 50 hours (n=24). These groups were generated based on responses to the question 'How many hours, on average, do you think your firefighter works per week (irrespective of their contracted hours)?'. This was completed in order to inform the suggested dynamic of a 'satellite firefighter' from study one and to explore the ability of the relatives to pool macro level resources to adapt to this satellite family member.

There were no statistical differences between the levels of macro resources pooled by relatives of firefighters who worked more than 50 hours per week (n=33) compared to relatives of firefighters who worked less than 49 hours per week (n=19).

Regarding the differences between the hours worked by relative (independent variable), there was also no statistical difference in the pooling of macro resources for relatives who worked more than 37 hours per week (two groups were formulated on the mean) compared to relatives who worked less than 36 hours per week using the same dependent variables as used previously.

7.17 MANOVA addressing familiarity with firefighter's role

The literature exploring impacts on relatives of firefighters allude to possible differences dependant on the length of time the relative has lived with the firefighter. This formed the last multivariate analysis of variance to be conducted for this empirical study. In keeping with the approach taken by this study so far, the mean of the sample was taken as a cut off to split the group. One group contained all the cases of relatives who had lived with their firefighter for 18 years or less ($n=28$), the other group contained cases of relatives who had lived with their firefighters for more than 19 years ($n=24$). Statistically significant differences were found between these groups.

A one-way between-groups multivariate analysis of variance was performed to investigate differences in macro pooled resources of relatives of firefighters and the number of years lived with their firefighter. Six dependent variables were used (perceived physical danger, fatalism, emotional contagion, personal growth, family functioning and resilience). The independent variable was number of years lived with firefighter.

Box's test suggested that the assumed homogeneity of variance-covariance had not been violated (.019). There was a statistically significant difference between years lived with firefighter on the dependent variables, $F(6,45) = 3.26$, $p = .010$; Wilks' Lambda = .697; partial eta squared = .30. This suggests there is a statistically significant difference between relatives who have lived with their firefighter for more than 19 years within the measures of this study. However when the results of the dependent variables were considered separately, using the tests of between subjects effects using a Bonferroni adjusted alpha level of .008, was fatalism, $F(1, 50) = 8.44$, $p = .005$, and emotional contagion, $F(, 50) = 11.71$, $p = .001$. Mean scores indicate that relatives who have lived with firefighters for less than 18 years have lower scores of fatalism and emotional contagion.

The scores between groups on the fatalism measure indicate that relatives who have lived with firefighters for a shorter amount of time endorse beliefs that fate, processes and behaviours of others dictates the probability of accidents. However relatives who have lived with their firefighter for more than 19 years reported higher scores suggesting they endorse their firefighter's ability to detect and respond to threats to their physical safety at work more than fatalism. The lower scores for emotional contagion reported by relatives who have lived with

their firefighter for less than 18 years indicate they are less susceptible/more resistance to emotional contagion. Relatives in the group who have lived with their firefighter for more than 19 years report being more susceptible to emotional contagion, indicating they receive the transmission of other's emotions more than the group who have lived with their firefighter for less than 18 years. The mean scores between these two groups for all variables within the macro resource model can be seen in the table below.

Table 7.17.1 Mean Scores Between Groups Dependent on Number of Years Lived with Firefighter

Variable	How long lived cut off	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Perceived Physical Danger	Less than 18	20.357	.664	19.024	21.691
	More than 19	19.875	.717	18.435	21.315
Fatalism	Less than 18	16.179	.640	14.893	17.465
	More than 19	18.917	.692	17.528	20.306
Emotional Contagion	Less than 18	44.929	.717	43.488	46.369
	More than 19	48.542	.774	46.986	50.097
Growth/Mastery	Less than 18	67.179	1.759	63.646	70.711
	More than 19	71.000	1.900	67.185	74.815
Family Functioning	Less than 18	19.607	.973	17.652	21.562
	More than 19	19.167	1.051	17.055	21.278
Resilience	Less than 18	129.714	2.808	124.075	135.354
	More than 19	135.875	3.033	129.784	141.966

This difference is not attributed to age as a MANOVA was completed on participants' age (using the same process of a mean split within the sample) and this was non-significant.

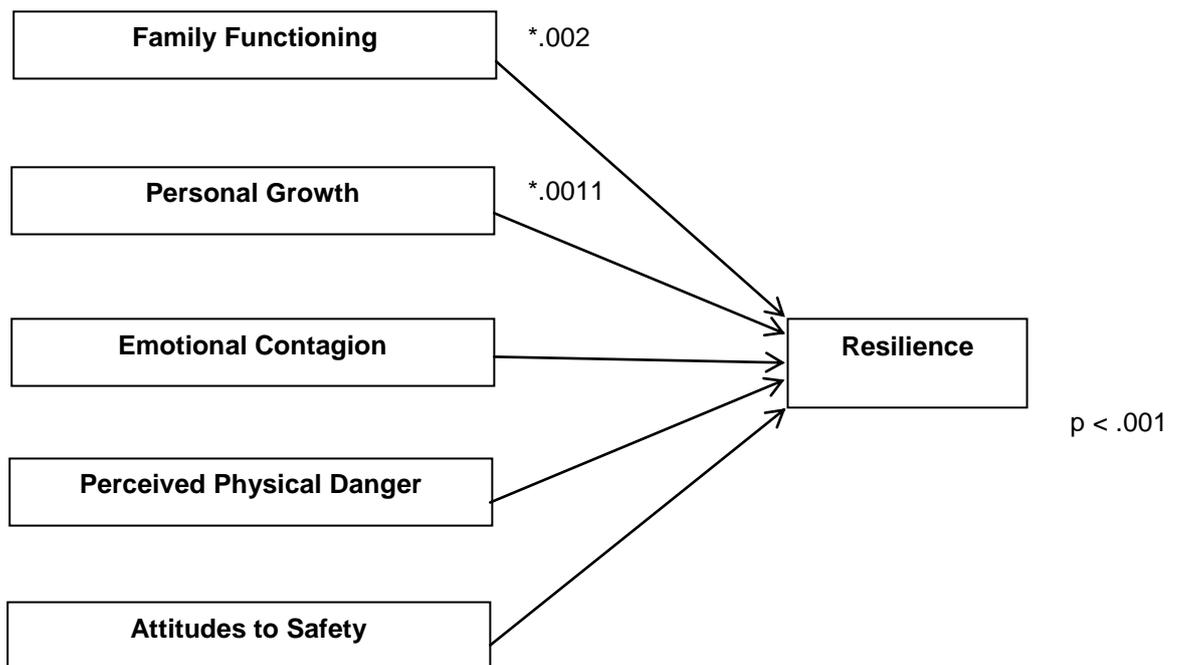
7.18 Regression Analysis

Following the calculations of the correlations and the tests of difference by the multivariate analysis of variance, a model was formulated in order to understand the relationships between the macro resources used by relatives of firefighters. The individual and social resources of resilience identified within study one were regressed on a multi-level process-orientated measure of resilience in order to see their predictive qualities. The model was tested to see if the resource variables would significantly predict resilience within relatives of firefighters. Multicollinearity, outliers, normality, linearity and homoscedasticity were checked and assumptions were met, including Mahal and Cook's values. Throughout these checks the only caution came from the sample size. Most published texts (Pallant, 2013; Tabachnick and Fidell, 2014) recommend between 10 and 15 cases (participants) per independent variable.

This would mean that this study requires 90 participants. After data cleaning n= 60 for this study. Therefore the probability of a type 1 or a type 2 error was increased. With this information the model was run.

A multiple linear regression was completed in order to assess the impact of five factors on the criterion of resilience. The five predictive factors were perception of physical danger, fatalism, emotional contagion, growth and family functioning as can be seen in the path diagram below.

Figure 7.18.1 Path Diagram of Resilience Model



A significant regression equation was found ($F(5, 47) = 6.997, p < .001$), with an Adjusted R Square of .366. The association between the criterion and the explanatory variables is moderately strong (multiple $R = 0.65$). The model explained 42% of the variance in resilience. The Adjusted R Square is also reported here due to the small sample size ($n=60$) which favours a more conservative estimate of variance within resilience at 36%. See table 7.18.2 below to see participants' resilience increase per independent variable. As shown in the figure above, only two predictors (growth and family functioning) made a statistically significant contribution to the prediction of resilience.

Table 7.18.2 Regression Coefficients for Study Two Dependent Variable: Resilience

Model Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations		
	B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part
(Constant)	133.132	27.798		4.789	.001	77.209	189.054			
Perceived Physical Danger	-.595	.503	-.132	-1.182	.243	-1.607	.418	-.117	-.170	-.131
Attitudes to Safety	.025	.500	.006	.050	.960	-.981	1.031	.022	.007	.006
Emotional Contagion	-.330	.440	-.091	-.750	.457	-1.214	.555	-.070	-.109	-.083
Growth/Mastery	.665	.170	.444	3.914	.001	.323	1.007	.528	.496	.432
Family Functioning	-.984	.296	-.377	-3.327	.002	-1.579	-.389	-.453	-.437	-.367

The standard regression coefficients strongest predictor of resilience was growth (18.66% of the variance within resilience) followed by family functioning (13.46% of the variance within resilience). Whilst the association between resilience and personal growth was positive, family functioning was negatively associated with resilience, such that higher scores on resilience (indicating more protection), predicted lower scores of family functioning (indicating the presence of more health within family functioning). The regression coefficient for personal growth was 0.66, for family functioning it was 0.98.

The standard regression coefficients show that, of the significant predictors, growth is the best predictor of resilience (18.66% of the variance within resilience) followed by family functioning (13.46% of the variance within resilience). The standardised regression coefficients show that, of the significant predictors, growth is the best predictor of resilience (Beta = .0.44) whilst attitudes to safety is the weakest (Beta = .006).

7.19 Discussion of Findings of Chapter

This chapter has examined a model of macro resource pooling, within the context of the firefighting occupation. Macro level resources (the individual and the family) were used to predict resilience in relatives of firefighters.

The model hypothesised that family functioning, personal growth, emotional contagion, perceived physical danger and attitudes to safety would predict the level of resilience in relatives of firefighters. This study informs the research question (B3) what individual and family

resources facilitate and maintain the resilience of relatives and (D8) what effect do the traumatic reactions of firefighters have on relatives.

Firstly the research aimed to identify which intrapersonal resources relatives of firefighters draw on to respond to the impacts identified in study one. The strongest predictor of resilience was growth. Personal growth as outlined by Ryff and Singer (2008) is a continued cycle of self-evolution facilitated by self-knowledge and effectiveness. As one overcomes challenges, so the next challenge is identified and the process of personal growth continues.

Research on individual differences within personal growth in adult development (Helson and Srivastava, 2001; Hill and Allemand, 2010) has identified that some individuals are more prepared to seek new experiences and situations in which they can develop. As their opportunities to engage with personal growth become more aligned with their own preferred frequency and type, so the individual feels that they have more resources to meet the needs of situations (Helson and Srivastava, 2001; Ryff and Keyes, 1995; Ryff and Singer, 2008; Hill and Allemand, 2010). The current study adds to this literature suggesting that personal growth is an intrapersonal resource with which individuals draw on to recover from adverse situations within the context of the firefighting occupation.

Clearly as indicated by the results of the MANOVAs, the longer the relative has lived with their firefighter the more educated the relative is on their role. This could be one way in which relatives are developing their personal growth, rather than the assumption from literature on other populations (Ryff and Singer, 2008) that it is the age which facilitates personal growth.

Scores of resilience suggests that this population is less resilient than the wider population in their perception of self, perception of the future and their general resilience score. In isolation, these scores do not indicate that there are necessarily less psychological tools available to this group, as this is a measure of effective use not quantity. This could indicate that relatives do not use all the psychological tools available to them to maintain their resilience, or they may not use them in a flexible manner, both of which would explain the lower resilience scores.

Having identified the intrapersonal factors relatives draw on to facilitate resilience to occupational impacts, this empirical study also aimed to identify the family resources relatives of firefighters use to respond to those occupational impacts. The second strongest predictor of resilience was family functioning. The association between resilience and family functioning was negative, such that scores of resilience indicating more protection were associated with scores of healthier family functioning. This association, in combination with the findings from study two, complements previous research findings such as Jackson, Sifers, Warren and Velasquez (2003). These studies provide evidence for the relative drawing from the family when a threat is posed to the individual from the firefighting occupation, in order to achieve resilience.

Suggesting that an increase in family functioning also increases the ability of the individual to bounce back from that identified threat.

Lower susceptibility to the transmission of positive emotions compared to the wider population appears to be unique to this sample when compared with the published literature that have used the same published measure. One consideration before interpreting this scale is that some literature (Hatfield, Cacioppo and Rapson, 1994) suggest the scale has a two factor structure (negative and positive affect), Doherty (1997) was clear that it was a unidimensional scale (Cronbach's alpha 0.90). The multidimensionality of the scale has been replicated elsewhere in the literature (Lundqvist, 2006; Lundqvist and Kevrekidis, 2008) and so in combination with the findings of this programme of research, this thesis has assumed it as a multidimensional scale with two factors (negative and positive affect). Following that assumption, the differences in means between the study sample and wider population can be explored further.

Although previous literature has established a link between emotionality and resilience (Armstrong, Galligan and Critchley, 2011), this findings appears to be unique in the literature. The more resistance to contagion of positive emotions of this sample could be attributed to social status of the sender of the emotions. The literature has established that there are individual and situational differences which influence the transmission of positive emotions (Kimura, Daibo and Yogo, 2008; Coenen and Broekens, 2012; Van der Schalk, Doosje, Hawk, Fischer, Wigboldus, Rottevell and Hess, 2011). These studies compared the emotional susceptibility when transmitting positive emotions and all concluded that contagion of the emotion might be dependent on the status (e.g. junior/senior or ingroup/outgroup) of the person transmitting the emotion. Livingstone and Srivastava (2012) completed work on positive mood transmission and focussed upon the mood of the target participant. They conclude that individuals who have frequent happy moods have established cognitive habits which support and facilitate further positive emotions. They up-regulate to positive emotions in everyday life using strategies and associations to increase their mood, in turn increasing their well-being.

The independent nature of this up-regulation can be linked back to Hatfield and colleagues (1994) original work exploring emotional contagion as mimicry. Livingstone and Srivastava (2012) suggest that displays of other people's positive emotions do not go through feedback mechanisms, unlike other moods. This means that positive emotions are reactionary or mimicked, and so the feedback which initiates contagion may not be activated for positive emotions.

As emotional contagion was non-significant within the model, this informs research question (D8) what effect do traumatic reactions of firefighters have on relatives. As this was not a significant predictor, this can be excluded as an explanation of relative's distress at firefighter's traumatic reactions. The next empirical study will explore this further in the next chapter of this

thesis to inform (D8) what effect do traumatic reactions of firefighters have on relatives, but also the remaining research question relating to traumatic reactions: (D7) what events do relatives perceive as distressing to firefighters.

If relatives are using cognitive strategies to manage their own positive emotional state, this can be assumed to be an indicator of personal growth or mastery. As personal growth is understood to be the ability to master one's own psychology, the Scores of this scale suggest a normal distribution for personal growth, which is comparative to the wider population (Ryff, 1995). That said, Ryff's validated process for interpreting data is to use the study sample as a benchmark, instead of a norm group. Although the data is normally distributed, the measures of central tendency cannot be compared to other groups. Suggesting the data could be distributed normally around a very different anchor of central tendency when compared to other groups/populations. This would suggest that the sample have normally distributed levels of personal continued development, but this might have higher than other population scores, providing some insight to the low susceptibility of transmitted positive emotions. Such that increased mastery would enable relatives to regulate their positive emotions themselves independent of others.

The positive correlation between emotional contagion and attitudes to safety behaviours within the Fire and Rescue Service could be explained through both constructs being underpinned by the active monitoring of the environment. This develops the argument proposed in the findings and discussion in study one, chapter five. Within that section of the thesis, findings suggested that relatives were actively monitoring their firefighter, initiating coping strategies used by the firefighter when the relative perceived a need. This was argued to be active well-being maintenance of the firefighter by the relative. Building upon this argument, a higher vulnerability to emotions, and the belief that their firefighter can detect and respond to threats to protect their physical safety at work, share a focus by the relative to those external to themselves. The relatives who are actively monitoring the emotional states of other's (and are therefore vulnerable to that emotional transmission) might also assume that their firefighter is actively monitoring and managing their environment at work to successfully reduce accident probability. However attitude to safety behaviour was not a statistically significant predictor of resilience.

The correlation indicating that as family functioning increases, resilience increases can be theorised using the theory of conservation of resources (Hobfoll, Vinokaur, Pierce and Lewandowski-Romps, 2012; Monnier, Cameron, Hobfoll and Gribble, 2002). Drawing on the literature surrounding resource caravans and gains, if one is functioning well for that individual, there is greater chance that they can acquire more resources. This notion, along with the statistically significant variables of personal growth and family functioning (in predicting resilience) informs the last focus of this empirical study; what resources aid the resilience of individual relatives. Within the model, variables accounted for a moderate proportion of variance

within resilience. This study provides further support for conceptualising resilience in interactive levels of individual, family and community (Patterson, 2002; Hobfoll, 1988; Schumm, Vranceanu and Hobfoll, 2004; Kolar, 2011; Vaishnavi, Connor and Davidson, 2007; Jackson, Sifer, Warren and Velasquez, 2003).

Patterson (2002) went further to suggest these levels could be linked by 'chains' or 'cascades' which trigger to facilitate the individual by drawing on those resources. Conceptualising resilience as the integration of the intrapersonal attributes of the relative within other levels such as the wider family of the firefighter allows a richer and more valid study of resilience within families of firefighters. This is echoed in other literature (Regehr and Bober, 2005; Hawley and DeHaan, 2003; Everson and Figley, 2011, Patterson, 2002). For these reasons, the model was effective in identifying the macro pooling of resources which aid the individual relatives of firefighters.

The other predictors fitted within the model did not achieve statistical significance. A larger sample size might have negated this, but this was not possible with this thesis. An alternative explanation for this is although they are identified as variables from the findings of study one, they may be aligned with higher-order constructs. Such that this study is seeking to identify resilience of *individual* relatives. The other variables identified by study one might be predictors of family resilience, or group resilience. This conceptual approach is outside of the scope of this study for reasons discussed in the introduction for this chapter. However future research might seek to unpack this possibility. This could be done by consulting with the whole family instead of one family member.

As demonstrated through the first set of multivariate analysis of variance focussing on hours worked by both the firefighter and their relative, it is the quality of impacts from the occupation, rather than their quantity, that influence how relatives use macro resources to ensure resilience to those impacts. In other words, the hours worked by either the firefighter or the relative does not influence their ability to pool macro resources in order to build resilience. Therefore the nature of working patterns, rather than the time spent working, is one clear challenge for the families of 'satellite firefighters'.

The findings of this thesis appear to contradict those of previous research suggesting that the shift pattern impacts upon family life (Regehr et al., 2005 and 2009; Kirschmann, 2004). However as this is unpacked further it has added to these previous findings and offers future direction for research. Concluding that it is the pattern and nature of working patterns, rather than the time spent at work, informs previous literature. From study one, it appeared that families of firefighters do feel challenges from the work patterns (such as social isolation, expecting the unexpected etc), however it is not sufficient to simply assume that these impacts are to do with the amount of time at work. Enabling 'satellite firefighters' who are not able to fully

integrate into family life would not be achieved simply by reducing the hours worked by those firefighters; it appears to be more complex than this.

The second exploration using multivariate analysis of variance found a statistically significant difference between scores of relatives who have lived with their firefighter for less than 18 years compared with those relatives who have lived with their firefighter for longer than 19 years. The fatalism measure indicated that relatives who have lived with firefighters for a shorter amount of time endorse beliefs that fate, processes and behaviours of others dictates the probability of accidents. Relatives who have lived with their firefighter for more than 19 years reported higher scores suggesting they endorse their firefighter's ability to detect and respond to threats to their physical safety at work more than fatalism. Greening and Chandler (1997) suggest that perception of harm increases when an individual believes that another is in control of the risk environment. The arguments presented in chapter three, sections 3.21, 3.22 and 3.23 hypothesised that the more expert the individual becomes on the occupation, they see the risks as more favourable (Vandermoere, 2008; Wogalter, Brems and Martin, 1993). Clearly the process of familiarity or normalisation (Davis, Ricci and Mitchell, 2005) is reflected in the scores for fatalism, but not in scores of threat to physical danger; there is no difference in scores between the groups for this measure.

This contributes to the literature published on the three factor model of appraising occupational risk by Leiter and Cox (1992). The lethality and prevalence of risk might not be able to be manipulated, but the perception of control that the firefighter does change over time. The Fire and Rescue Services could produce information for relatives in order to manipulate the perceived risk of danger in order to reassure the relative. By moving the risk from a more fatalistic belief to a belief that the firefighter has the efficacy to respond to risk, this would scaffold the relatives' successful appraisal of risk as outlined in the arguments put forward in chapter 3 surrounding the protection motivation theory (Martin, Bender and Raish, 2007), additionally combined with the Conservation of Resource Theory (Hobfoll, 1988) would ultimately add another resource for relatives to pool to maintain resilience. This could trigger a resource spiral.

The lower scores for emotional contagion reported by relatives who have lived with their firefighter for less than 18 years indicate they are less susceptible/more resistance to emotional contagion. Relatives in the group who have lived with their firefighter for more than 19 years report being more susceptible to emotional contagion, indicating they receive the transmission of other's emotions more than the group who have lived with their firefighter for less than 18 years. This informs the literature reviewed in chapter 3, section 3.23. The documented transmission of emotions and stress between couples include the use of the control within the partner's job as a resource for themselves (Westman and Etzion, 1995). As the control of the accidents transfers from the environment to their firefighter, so the relatives have access to use

their firefighters control in their role to maintain their own resilience. This would provide an explanation for the finding that both these variables change dependent on the number of years lived with their firefighter.

Developing the theoretical implications of this finding further, this would suggest that emotional contagion is not related to the transmission of traumatic reactions (Westman, Vinokur, Hamilton and Roziner, 2004), but that it facilitates the relatives ability to adapt to the likelihood of occupational injury or accident. It facilitates this increase in adaptation by offering another macro resource to pool within the family. As this resource is mediated by the firefighter themselves, one application of this finding is that Fire and Rescue Services educate their firefighters about this benefit in sharing information about their role (rather than operational incidents) with their relatives. This would also encourage a resource gain spiral.

Having explored the theoretical and real world applications of these findings of macro resources pooled for resilience maintenance, there are a few directions for future research. Previous research has identified a range of possible predictors of resilience (Smith, Dalen, Wiggins, Tooley, Christopher and Bernard, 2008; Hjemdal, Friborg and Stiles, 2012; Hjemdal, Friborg, Stiles, Rosenvinge and Martinussen, 2006; Friborg, Hjemdal, Rosenvinge and Martinussen, 2003), these findings suggest that this is not the case for relatives of firefighters. It may be the case that the predictors seen in the wider population does not hold true for specific populations (Kolar, 2011).

7.20 Conclusion to Chapter

Following this empirical study, identified impacts and resources identified in study one at an individual and kin-family level may align to larger constructs, such as well-being within which resilience sits (Wood, Joseph and Maltby, 2009). This is considered in the next chapter (study three), along with an exploration of the other resource tier: the community and organisational context. Explanations that resources could maintain resilience or well-being find support in the existing literature (e.g. Burton, Pakenham and Brown, 2010). This thesis seeks to explore this by modelling a meso level of resources within the fire community. This will form the basis of the next empirical chapter, study three.

Chapter Eight: Study Three, Models of Well-being

8.1 Introduction to Chapter

Study three was shaped in order to refine the theory that has been developed in study one and tested, in part, in study two. Study one focussed upon the development of the conceptual theory; study two aimed to test the individual and family layers within that model and the resulting analysis explained 36% of the variance in resilience. Personal growth and kin family functioning were the only predictors of the model which made a statistically significant contribution to the prediction of resilience. Original contributions have also been made to the literature based upon hours worked within the family, patterns of working, length of time lived with a firefighter, perceptions of accidents and emotional contagion. Study three was designed to move the research focus from the kin family to the fictive/kith family (the FRS family), and to consider the wider Fire and Rescue Service group and culture, moving from the macro to the meso.

This chapter will seek to test the model identified in chapter five, particularly with reference to the relatives' responses to impacts at the meso level. The meso level is the individual and their fictive family, as defined in chapter three, section 3.8 and chapter 5, section 5.12, which is representative of the wider culture of the Fire and Rescue Service. This will identify the interpersonal resources which relatives of firefighters draw on in order to respond to impacts from the occupation. The empirical study will also seek to identify specific impacts on relatives of firefighters, such as the impact of firefighters displaying traumatic reactions.

In chapter three, the research debates presented on: fictive families processes (section 3.18), perception of risk (section 3.21, 3.22, 3.23) and previous empirical chapter, the impact of traumatic reactions between family members (section 3.14, 3.16, 3.17) and previous empirical chapter suggesting emotional contagion should not be explored further in this context, work-home interface and transitions between domains (section 3.2, 3.3, 3.4) and the Conservation of Resource Theory (section 3.27) which can be used to integrate and operationalise the model of individual and societal/cultural resources. This illuminates (C5) the psychological resources used to facilitate and maintain the well-being of individuals. The collective reservoir of resources a cultural group of people use to maintain their psychological well-being can flow freely between members. This allows members to give resources to one individual if they are depleted and facilitates the absorption of stressors by all members rather than one individual.

At the meso level, Hobfoll's (2011) 'engaging resource ecologies' becomes relevant. These are usually organisations or other such structures which actively encourage the 'pooling' of resources for the employees, departments or groups to access when needed. This phenomenon, according to study one, is delivered by the FRS Family, and, if supported by the

FRS, could become an engaging resource ecology offering insights to the benefits of this structure for relatives. This would illuminate (B5) how can the Fire and Rescue Service support relatives to effectively respond to occupational impacts of firefighting and support their firefighter.

As this model is exploring these aspects at the meso level, the common reference to explore that a person is successfully managing their resources is if they are achieving a high score on well-being (Hobfoll 1990; 2001; 2002; 2011; 2012). This also addresses the research question to identify the resources that facilitate and maintain the well-being of individual relatives. Therefore, this study will test this model of meso resource pooling, within the context of the firefighting occupation. This will be the focus of this chapter.

In order to establish how situated this model is within the culture of a country's FRS, a cross-cultural comparison will be performed in order to establish (C6) how the experience of firefighters' relatives in Europe compare with the experiences of those in North America. Prevalence could indicate generalisability amongst this culturally/organisationally situated group. A comparison will also be completed using length of service to indicate relatives' possible exposure to FRS culture.

Empirical and theoretical discussions throughout previous chapters in this thesis have considered the effects of traumatic reactions of relatives. Establishing (D7) what events do relatives perceive as distressing to firefighters and (D8) what effect do the traumatic reactions of firefighters have on relatives would illuminate these debates.

As discussed in chapter 7, section 7.19 has demonstrated, this thesis is interested in the well-being of relatives of firefighters. Throughout the selection of the measure of well-being, the conceptual definition remained holistic, searching for a unidimensional scale. Some well-being literature (for example Burns, Anstey and Windsor, 2011) suggests that well-being should be considered as either subjective well-being or psychological well-being. The findings from study one highlighted that participants discussed aspects of both, across the construct of well-being rather than limiting it to one or the other. To meet this conceptualisation of well-being in this study, a unidimensional scale was identified in chapter 6 that measured across the construct. The Warwick-Edinburgh Mental Well-being Scale (WEMWBS) has a wide conception of well-being, including affective-emotional aspects, cognitive-evaluative dimensions and psychological functioning (Tennant et al., 2007; p. 64). The scale also measures well-being with parity across cultures (Taggart, Friede, Weich, Clarke, Johnson and Stewart-Brown, 2013). This equivalence between cultures was invaluable to successfully compare findings across cultures of Europe and North America as demanded by one of the research questions.

A conceptually wide and culturally unbiased representation of well-being was used to explore and model the individual and group resources identified within study one. The theoretical framework reviewed in chapter three suggests a unique set of resources available to relatives of firefighters in comparison to the wider population. At the meso level of resources available, relatives of FRS personnel have different resources available to them such as focussed, experienced groups within the FRS family.

Table 8.1.1: Resources Included in the Modelling of Meso Structures in Study Three

Individual	Family	Fire and Rescue Service
Perception of Risk	Secondary Trauma	FRS Family
Attitudes to Safety (Trust in Operational Safety)	Sacrifices (Excerpts)	Work-Home Spillover
Well-being		

This chapter has summarised the relevant literature, it will outline the empirical methods and approaches used, present the results and lastly present the findings.

8.2 Method

The questionnaire designed for study two was refined to align with the research aims of study three (see appendix 3) to measure the concepts contributing to the family, cultural, societal level. This facilitated a distilled, refined operational model for study three which aimed to examine what the Fire and Rescue Service could do to decrease the impact of the occupation on relatives. The scales and sub-scales used in this questionnaire had already been piloted (as detailed in other chapters of this thesis). The questionnaire pack was transferred in to the SurveyMonkey tool in order to distribute to a wide, international sample of relatives of firefighters. Inclusion/exclusion criteria matched those of study two, except it was restricted to spouses only. This was to ensure that the structure of the FRS family (with specific membership) could be included. The potential to complete structural equation modelling (SEM) on this data was explored, however after weighing up advice from published literature (Kline, 1991; Tanaka, 1987; Bentler and Yuan, 1999; Streiner, 2006; Ullman, 2006; Tabachnick and Fidell, 2014; Maruyama, 1998; Hoyle, 2011) it was clear that the measure of risk was theoretically sound but does not support the SEM statistical process. When weighing up this decision, academic judgement was applied and a single item of risk was favoured as this would provide a sound measurement, closer to the construct of risk but with more integrity. Accordingly, path analysis was completed.

8.3 Recruitment of Participants

The online survey was embedded in the pre-existing recruitment strategy developed for study two (see previous chapter). Also, in line with study two, to complement these activities the research details and invitation to participate were also sent to the Fire Fighters' Charity which disseminated the invitation to participate to their membership. It was also sent to all professional contacts the researcher had built up through their research focussed on the Fire and Rescue Service. The research invite and details were also sent to the Chief Fire Officers' Association, the Fire Brigades Union, the International Association of Fire Fighters, every Chief Fire Officer in England, Scotland and Wales, all Fire and Rescue Service trade magazines/journals, as well as posted on twelve firefighter-related forums.

8.4 Participants

Participants were aged between 21 and 69 years of age with a mean age of 42.63 years (12.07). The sample was restricted using inclusion criteria which specified that the participants had to be living with a serving firefighter for at least six months and be their spouse. As can be seen from the table below, most participants were married to their firefighter. Two participants selected 'other'; one was due to marry their firefighter in four weeks and one termed themselves as having a common-law marriage.

Table 8.4.1 Marital Status of Participants in Study Three

	Frequency	Percent	Valid Percent
Married	93	77.5	78.8
Single	3	2.5	2.5
Cohabiting	16	13.3	13.6
Civil Partner	3	2.5	2.5
Widowed	1	.8	.8
Separated	2	1.7	1.7
Total	118	98.3	100.0
Missing	2	1.7	
Total	120	100.0	

Of the participants, there were only twenty five male participants; 102 indicated how many hours they are contracted to work per week (mean 33.35, SD 15.7). The mean age of the children of the participants (n=87) is 16.43 (11.02). Their country of origin is captured in the table below.

Table 8.4.2 Table Depicting the Country Participants Reside In

Country of Residence	Frequency
Canada	20
Spain	1
United Kingdom	69
USA	25
Missing	5
Total	120

As can be seen from the table above, the majority of participants originated from the United Kingdom with a large proportion of participants also living in North America.

The firefighters had a mean length of service of 20.07 (10.26) years. Their mean age was 45.66 years (13.34), and have a mean of 1.9 (1.2) children with a mean age of 16.8 (14.3) years. There were 113 male and 7 female firefighters. The table below describes their working status within the FRS:

Table 8.4.3 Table of Firefighters' Working Status for Study Three

Is/was your firefighter	Employed full time basis	Volunteer full time basis	Volunteer part time basis	Employed part time	Firefighter level	Junior Manager level	Middle Manager level	Senior Manager level	Retired	Medically Retired	Still Working
N	86	19	7	17	53	26	20	21	20	1	99
Total	129				120			120			

The total figure for the employment term of the firefighters exceeds the number of participants, however in most countries full time firefighters can also be a retained or volunteer firefighter when they are not on their full time shift. This practice is currently being debated within the UK but that practice does explain the seemingly unusual figure. As can be seen from the table the majority of relatives are spouses of full time firefighters who are still in service.

8.5 Data Analysis of Study Three

Data cleaning was carried out as per study two; chapter seven, section 7.6. Following that process, the data were examined for missing data in order to make it fit for purpose.

8.6 Deleting Cases

Total number of cases which had been established in the data collection process was 234; after removing cases where only the unique identifier had been completed this dropped to 186. Having removed those cases with over 20% missing data this dropped to 60. These data were then added to the data from time point one, but only for variables that had not been previously been included in any analysis, resulting in a total n of 121 cases (51.7% of the original responses).

8.7 Alterations to Variables

The items asking for the ages of children or adults within the household were aggregated and replaced with the mean score of each variable per household. In other words, a mean was calculated separately for the age of other residents and used in subsequent analysis.

8.8 Missing Values

The 'do not wish to answer' options were all coded as missing within the analysis. Categorical and scale data errors were checked for through the frequency function of SPSS. As with study two, the same two demographic/sample descriptive items contained outliers, and the same solution was employed to manage them.

A missing values analysis was then conducted using the same principles in study two. All were within acceptable levels as can be seen in the table below. The deletion of cases with more than 20% was completed as a threshold approximation where the mean and SD are stable when compared to more complete data sets (Streiner, 2002) and the patterns of missing data were checked to see if attrition points indicated anything about those items or scales. The only high attrition rate was identified around the message stating they had reached half way (similar to study two).

Table 8.8.1 Missing Value Analysis

Construct Measured	Of the variables, how many have at least 1 missing value	Of all 60 cases, how many contain at least 1 missing value	Of the total sum of values, how many of the values are missing	Comments
Perception of Risk	1 (100%)	1 (1.66%)	1 (1.66%)	Acceptable
Trust in Operational Safety	7 (100%)	3 (2.48%)	9 (1.06%)	Acceptable
Spillover	5 (83.33%)	5 (4.13%)	9 (1.24%)	Acceptable
Secondary Trauma	18 (100%)	37 (30.58%)	217 (9.96%)	Missing values are not patterned and within acceptable range.
Sacrifices Scale	8 (100%)	13 (10.74%)	24 (2.4%)	Acceptable
Well-being	14 (100%)	13 (10.74%)	31 (1.83%)	Acceptable
FRS Family	12 (100%)	26 (21.49%)	98 (6.75%)	Acceptable

Missing data were then replaced by the mean of the item score (Streiner, 2002); making the data ready for analysis (please see discussion of missing values in the previous chapter for a rationale of this approach). The data were then recoded as appropriate and totalled.

8.9 Outliers

Within the assessment of the normality of the data, the histograms and boxplots identified outliers within the sample. To assess the extremity of these outliers Z scores were calculated. Using the metric of a Z score of in excess of 3.29 (Tabachnick and Fidell, 2014; Pallant, 2013) four outliers were identified. These outliers all belonged to the same case (participant). As a result of this, the participant's data was removed from the data set to avoid a bias or undue influence on the analysis. This gave a total n of 120.

8.10 Measures Exploring Normality

Normality was explored and overall the tests suggested there were no obvious impacts upon the data. The mean, confidence intervals (95 per cent), 5% trimmed mean, extreme values, skewness, kurtosis, Kolmogorov-Smirnov, histograms and plots (Normal Q-Q, Detrended Normal QQ and box) were all examined for each scale in turn. See table below for a summary.

Table 8.10.1 Normality Measures

	Mean	5% trimmed	Skew.	Kurt.	K-S	Comments on Hist., Normal Q-Q, Detrended Q-Q, Boxplot
Trust in Operational Safety	14.27	13.98	1.01	2.3	.000	Positive peaked skew. Behaves as expected. Most values cluster at zero. Histogram suggests one clear outlier with a value of 35. Boxplot suggests 2 outliers (values of 27 and 14), 1 extreme outlier (value of 6).
Spillover	18.16	18.17	0.25	-1.29	.001	Positive, flat distribution. Behaves as expected. Values do not cluster close to zero.
Secondary Trauma	29.03	27.85	2.7	11.64	.000	Positive, peaked skew. Behaves as expected. Values do not cluster at zero. Histogram suggests one clear outlier with a value of 90. Boxplot suggests lots of outliers (five outliers and 8 extreme outliers).
Sacrifices	18.42	18.42	-.008	-.27	.019	Negative, flat distribution. Behaves as expected. Deviates from zero frequently.
Well-being	49.22	49.42	-.43	.96	.03	Negative, peaked distribution. Behaves as expected. Values cluster around zero. Boxplot suggests two outliers (values 30 and 48).
FRS Family	25.62	25.37	.62	1.46	.000	Positive, peaked skew. Behaves as expected. Clusters around zero. Boxplot suggests a high frequency of outliers (10 outliers and 2 extreme outliers).

Measures assessing clinical psychological constructs such as the Secondary Trauma Scale have a recognised (Pallant, 2013) positive skew within the 'normal' population as most people record relatively few symptoms. Therefore a lower score is more frequent and the general trend is to a positively skewed sample. Given this, and the advice offered in the literature such as Steiner (2000), the trimmed mean is displayed in the table above. This trimmed mean should be referred to for the Secondary Trauma Scale. This ensures the most extreme scores are not included, producing a more conservative mean.

8.11 Descriptive Analysis to Explore Scores of Study Three

The means for each scale were examined to establish scores of the sample. The overall scale means were examined; subscale means were not appropriate as through the transition between study two and study three, scales were prioritised for unidimensionality. This resulted in study three being mainly comprised of scales with structures suitable for an overall mean report.

Table 8.11.1. Means and Standard Deviations of Scales for Study Three

	N	Mean	SD
Risk Perception	119	3.8235	1.17637
Trust in Operational Safety	120	2.0141	.63538
Spillover	120	18.2650	7.71155
Secondary Trauma	120	28.5259	8.42718
Sacrifices Scale	120	2.3133	.54182
Well-being	120	3.5368	.64654
FRS Family	120	2.1197	.51951

8.12 Scores

The nature of the scores within this sample was explored through using published cut off scores where applicable, or the recommended form of calculating categories of responses. The first to be explored was Trust in Operational Safety; the mean for this study is 2.01. The Mearns et al paper did not provide cut off scores, however when re-visiting the original source of the items (Rundmo, 1992a), the system of using percentage endorsed was advocated. In line with this, the mean values of items were calculated without differential weighting. This meant the lower the percentage, the more unsafe people felt.

Rundmo published a percentage endorsed of 72 which means that, of his population (offshore oil rig workers), 72% felt safe. For this study, 78% endorsed a safe feeling, reflecting Rundmo's categorisation that "Those who felt "safe" or "extremely safe", were defined as "safe". The category "not safe" means the absence of a clear feeling of safety and included responses of: "neither safe nor unsafe", "unsafe" and "extremely unsafe" (p. 46). Therefore inferring that 65% of respondents for this study felt that the safety procedures of the firefighting occupation were

'not safe'. The table below provides percentage endorsed per item of the trust in operational safety procedures. It does not provide the percentage endorsed by Rundmo's population as this was comprised of Norwegian offshore oil workers. Therefore the scale was administered to this sample in a different language to collect this data. Instead, Mearns et al.'s published UK sample of offshore oil workers is reported in recognition that increasing the homogeneity between the samples increases the integrity of the comparison.

Table 8.12.1 Percentage Endorsing Each Item of the Trust in Operational Safety Scale

	First aid training	Safety Instructions/training	Follow-up measures after accidents	Emergency response training	Safety control and inspection routines	Safety officer/procedures	Availability of personal safety equipment
This Study	77	84	60	86	77	72	87
Mearns	64	78	76	70	80	76	90

From the table we can see that for every item apart from one, the percentage of the population endorsing a 'satisfied' or 'very satisfied' position is higher than that of the offshore oil workers. The only exception is for 'Follow-up measures after accidents'. This might be because within the percentage endorsed method, Rundmo advocates that the middle Likert response of 'not sure' is taken as a negative. Therefore it might simply be that the level of knowledge relatives have about this procedure is limited, providing an explanation for the slight dip in endorsement when compared with the Mearns data.

Stevens, Kiger and Riley (2006) published means for the measure of spillover for both males and females. This is because the underlying theoretical basis suggests that males and females perceive spillover differently, partly because of the differences in relatedness to family cohesion and other such variables. Considering the nature of the questions relating to maintenance of the family home and life, there could also be a difference relating to the expectations of roles and distribution of unpaid work (such as housework and childcare) between males and females. Therefore the published mean for a sample population of females was 13.93 (4.07). The mean for this study for female participants of spillover is 18.28 (7.7) (males from the sample in this study were removed for this analysis). This is in the context where the higher the score the higher the spillover from the firefighting occupation in to the home. When comparing these

means the relatives of firefighters perceive there to be more spillover than the comparator population. The comparator population was derived from a random sample of working residents of Utah. Although the sample was mostly comprised of UK citizens, as could be seen previously in this section, the sample population did contain some participants from other English speaking countries.

Published literature on the Secondary Trauma Scale (Motta, Newman, Lombardo and Silverman (2004) published advice that “scores of 38 or higher are indicative of mild to severe anxiety and depression and are also related to problematic intrusion and avoidance symptoms” (p. 72). Within this study eight participants scored between 38 and 44. Motta and colleagues go on to suggest that “Scores of 45 or higher on the STS should, at the very least, alert the clinician to the possibility of significant emotional concerns” (p. 72). Seven participants scored between 45 and the highest score of 62 within this study. Given that the adaptation made to this scale for this study demanded relatives completed the scale thinking of an event which their firefighter had experienced, this infers that of the sample of 120 participants fifteen (12%) have been deeply affected by the reactions their firefighter has displayed to an event at work to clinical levels, and that seven participants could have associations of “severe anxiety, depression and symptoms of unwanted intrusion and avoidance” (Motta et al, 2004, p. 74).

The researcher developed scale of ‘Sacrifices Scale’ which was developed from the comments of participants from study one does not have published cut offs as it has only been used within this research programme to date. Using the population sample to reference the higher and lower scores seems logical given that the scale was developed through research with other members of this population. Therefore developing a self-referencing cut-off system seems appropriate. There are twenty five participants whose scores are above the 25% percentile and twenty three participants whose scores for this scale are below the 75% percentile. This suggests that from the total (n=120) comparatively similar numbers of the sample who feel their family make sacrifices to facilitate the work of their firefighter, as who feel they make very few sacrifices to facilitate the work of their firefighter. On this measure, a higher score indicates fewer sacrifices and a lower score indicates more sacrifices are perceived to be made by the family.

Although the mean for The Warwick-Edinburgh Mental Well-being Scale (WEMWBS) was reported in the table for consistency, Tennant, Hillier, Fishwick, Platt, Joseph, Weich, Parkinson, Secker and Stewart-Brown (2007) published a median for demographic groups from a general population sample. For the group ‘females’ (n=966) the median was 51 and for the group ‘married/living as a couple’ (n=418) the median was 52. These groups were selected for the similarity with the study group. Norm group comparisons should be as homogenous as possible (Furr, 2011). For this study, the median was 49 (percentile 50 = 49.2), slightly less, but still within close proximity to the published medians for the selected norm groups. This would suggest that relatives of firefighters do not have a general lower score for well-being than a general population sample with similar characteristics.

The means and standard deviations measuring family functioning of the fictive family, the FRS Family, were compared for the McMaster Family Assessment Device (FAD) between this sample and the published cut off scores (Miller, Epstein, Bishop and Keitner, 1985). As with the kin family in study two, these scores indicate healthy and un-healthy family scores. This study only used the 12 item subscale of General Functioning as per the family functioning measure in study two. The published means and standard deviations of these cut off scores and the mean and standard deviation for this study can be seen in the table below.

Table 8.12.2 Means and Standard Deviations of the FAD General Functioning Subscale for the FRS Family

	This Study	Published work	
		Healthy Family	Unhealthy Family
Mean	2.12	2.03	2.36
SD	0.52	0.55	0.56

Scores on the General Functioning subscale of the FAD measures the six areas of functioning which the full FAD measures. These six areas of functioning comprise: problem solving, communication, roles, affective responsiveness, affective involvement and behaviour control. These means should be contextualised in the reference that the higher the mean score, the greater endorsement of unhealthy items rather than healthy items. So a lower mean would indicate that the family have fewer challenges within their six realms of functioning. The mean for the participants in this study indicate that it is above the mean for a healthy family, but below the cut off for an unhealthy family. Thus, the mean was located within the threshold of a healthy family, implying that, on balance, most of the relatives had a helpful relationship with their group, with fewer challenges of problem solving, communicating, being effective in their FRS family roles, in their responsiveness to each other, their involvement with each other and controlling their behaviour. These findings suggest that the Fire and Rescue Service groups are mostly functioning well. It should be noted that this mean is quite considerably higher than the mean for kin family functioning. This is to be expected as role definition; communication patterns and behaviour within a kin family are negotiated and rehearsed more frequently than the fictive family of the FRS group.

The last scale to be explored was Perception of Risk. As this was a single item measure, to proceed using the cut off as above the 25% and below the 75% percentiles would not have been sensible. Using the same percentage endorsed sample description as for the scale preceding this discussion, 73% of the sample replied that they believed the firefighting population to be risky, the frequency counts for each reply to this single-item measure can be seen in the table below.

Table 8.12.3 Frequency Counts for Responses to Single Item Risk Measure

	Frequency	Percent	Valid Percent	Cumulative Percent
Sometimes risky	31	25.8	26.1	26.1
Not sure	1	.8	.8	26.9
Risky	45	37.5	37.8	64.7
Very risky	42	35.0	35.3	100.0
Total	119	99.2	100.0	
Missing	1	.8		
Total	120	100.0		

With a mean of 3.8, with 3 being 'Not sure' and 4 being 'Risky', this information, together with the frequency counts, indicated that most relatives within this sample perceive the firefighting occupation to be risky.

8.13 Reliability Evaluations of Scales and Subscales for Study Three

This enabled a reliability analysis to be completed in order to check each subscale/scale. The current study yielded a Cronbach's Alpha coefficient of 0.87 for trust in operational safety. The published alpha coefficient by Mearns et al. (2004) is 0.85. The mean for this study was 2.10 (0.63) within a context where the lower the score the higher the trust in operational safety. For the spillover scale, Stevens et al. (2006) reported a Cronbach's Alpha coefficient of 0.92 for women and 0.88 for men. This study reported a Cronbach's alpha coefficient of 0.91 (sample contains 96 females and 25 males). The Cronbach's Alpha coefficient for female participants only within this study was .91 (n = 113 excluding pairwise). The mean for this study was 3.04 (1.28) this is within a context where the lower the score the more spillover is present. The reported coefficient for the secondary trauma scale by Motta et al (2004) is 0.89. For this study, it was slightly stronger at 0.92. The mean for this study was 1.58 (0.46) where the lower the score the less reporting of secondary trauma symptoms. The published Cronbach's Alpha coefficient for The Warwick-Edinburgh Mental Well-being Scale is 0.91 (Tennant et al., 2007), for this study it is 0.94. The mean for this sample is 3.53 where the lower the score the lower the endorsement of well-being. The published Cronbach Alpha coefficient for the general functioning scale of the Family Assessment Device was 0.92. For the current study it was 0.93 (with a mean of 2.11), where a lower score indicates higher functioning.

Unlike the other five scales, the Sacrifices scale was not a pre-validated scale. As such, there are no published Cronbach Alpha Coefficients for this scale. The statements forming the scale were developed from statements made by participants in study one. Due to this, the scale structure will be examined here. However, as scale development did not form part of the aims of this research programme, this will only be a brief overview. The Cronbach's Alpha for this eight item scale was 0.36 suggesting low internal consistency reliability. This is where the lower the

score the more sacrifices are perceived to be made by the family for their firefighter's occupation. The scoring ranged from strongly agree to strongly disagree through a five point Likert scale. Within the inter-Item Correlation Matrix there are fifteen negative correlations. This might suggest that some items should be reversed and that a factor analysis should be conducted on this scale. The mean score for this study was 2.3 (0.51).

8.14 Factor Analysis of the scale 'Sacrifices Scale'

An exploratory factor analysis was run on this eight item Sacrifices scale. With such a small number of items, interpretation has been cautious throughout this analysis. However, despite these considerations it was considered good practice to run this analysis in order to explore the structure of this scale which would determine if it was robust enough to include in the future, wider analysis. A Principal Components Analysis (PCA) with Oblimin rotation was performed. After the initial PCA was completed, a second PCA was conducted forcing a two factor solution. The output of which (specifically the information within the Communalities table) suggested a deletion of one item from the scale "The Fire and Rescue Service is more than just a job, it is a way of life". Deletion of this item was completed as it had a value of less than .3 (the value was .133). The output from this process is summarised in the table below:

Table 8.14.1 Principal Component Analysis Output

	Most coefficients above .3?	Kaiser-Meyer-Olkin value	Bartlett's Test of Sphericity value	Eigenvalues greater than 1	No. of Factors in solution	Variance explained
PCA	Yes	.71	Reached significance	2	2	58.4%
Two factor, one item deleted	Yes	.70	Reached significance	2	2	65.29%

These tests support the appropriateness of completing PCA and suggest that these items load clearly on to two factors. The final two factor solution (one item deleted) explained 65.2% of the variance. The first factor is comprised of the first four items and describes the impact upon families of how the job is arranged (such as shift work). This subscale will be called 'Impact on Families' and explains 37% of the variance. The last three items load clearly on a second factor and describe the reciprocal relationship expected by the family with the Fire and Rescue Service as an organisation. This subscale will be called 'Reciprocal Relationship' and explains 28.2% of the variance. An inspection of the scree plot depicted a clear break after two factors. Further consideration also supported a two factor solution with items loading clearly and substantially on only one factor. There was a weak negative correlation between the two factors ($r = -.07$) suggesting that the two factors might not be related. This is not unusual for a scale new in development and trialled for the first time (Furr, 2011). As this scale was initially developed from study one (an original contribution to literature), the theoretical basis of this scale is not supported by a rich plethora of existing literature. Therefore future studies could consider developing this scale, both theoretically and structurally in order to capture the sacrifice and expectations families may experience in relation to their spouses employment.

The output suggests that this seven item scale has a clear and simple two factor structure. There are considerations (such as the small n and the small number of items) that mean the interpretation should be considered with caution. The small n ($n = 120$) caused further examination as per the unresolved discussions within the literature of ratio between items and factors. Having proceeded with the checks outlined in Tabachnick and Fidell (p. 666, 2014), the smaller sample size of this PCA was determined to be acceptable with a cautionary note that the solution might fail to converge (the final solution for this study converged in four iterations). With fewer items to indicate each factor caution was heeded and this information was considered alongside the Cronbach's Alpha Reliability Coefficient. The decision was made in the interests of integrity of the final interpretations that this scale will be included in the main analysis, but extreme caution would be used throughout the inferences. The Pattern Matrix and

Structure Matrix of the final solution (forced two factor solution containing only seven items) are displayed below.

Table 8.14.2 PCA Pattern Matrix for 'Sacrifices Scale' within Study Three

	Component	
	1	2
The shift system my firefighter is currently on means that my firefighter spends more time with our family (If your firefighter is now retired, please answer relating to the last shift system they were working for the majority of their time before retiring from the FRS)	.800	-.055
The shift system my firefighter is currently on means the family sometimes miss out on things (If your firefighter is now retired, please answer relating to the last shift system they were working for the majority of their time before retiring from the FRS)	.783	-.023
The shift system my firefighter is currently on means I can't have regular activities (If your firefighter is now retired, please answer relating to the last shift system they were working for the majority of time before retiring from the FRS)	.779	-.094
The shift system my firefighter is currently on means that my firefighter is closer emotionally to our family (If your firefighter is now retired, please answer relating to the last shift system they were working for the majority of their time before retiring from the FRS)	.766	.177
Families of firefighters live their lives in the service and therefore can expect a level of help and support back	-.084	-.867
Fire Service events are important because as well as being social, the family benefits from speaking to other people who have similar issues	.107	.823
The family is as much a part of the Fire and Rescue Service as their firefighter as they make a lot of the sacrifices	.252	-.752

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

a. Rotation converged in 4 iterations

Table 8.14.3 Structure Matrix Output for 'Sacrifices Scale' within Study Three

	Component	
	1	2
The shift system my firefighter is currently on means that my firefighter spends more time with our family (If your firefighter is now retired, please answer relating to the last shift system they were working for the majority of their time before retiring from the FRS)	.804	-.110
The shift system my firefighter is currently on means I can't have regular activities (If your firefighter is now retired, please answer relating to the last shift system they were working for the majority of time before retiring from the FRS)	.785	-.147
The shift system my firefighter is currently on means the family sometimes miss out on things (If your firefighter is now retired, please answer relating to the last shift system they were working for the majority of their time before retiring from the FRS)	.784	-.076
The shift system my firefighter is currently on means that my firefighter is closer emotionally to our family (If your firefighter is now retired, please answer relating to the last shift system they were working for the majority of their time before retiring from the FRS)	.754	.125
Families of firefighters live their lives in the service and therefore can expect a level of help and support back	-.025	-.861
Fire Service events are important because as well as being social, the family benefits from speaking to other people who have similar issues	.051	.815
The family is as much a part of the Fire and Rescue Service as their firefighter as they make a lot of the sacrifices	.303	-.769

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

8.15 Correlations

Bivariate correlation analyses were completed to explore the relationships between the variables. The table of correlation coefficients is displayed below.

Table 8.15.1 Correlations of all Variables in Study Three

		Secondary Trauma	Well-being	FRS Family	Spillover	Sacrifices	Trust in Operational Safety	Risk Perception
Secondary Trauma	Pearson Correlation	1.000**	-.327**	.067	-.240**	-.323**	.159	.237**
	Sig. (2-tailed)	.001	.001	.468	.008	.001	.083	.009
	N	120	120	120	120	120	120	119
Well-being	Pearson Correlation	-.327**	1.000**	-.240**	.343**	.389**	-.152	.042
	Sig. (2-tailed)	.001	.001	.008	.001	.001	.098	.649
	N	120	120	120	120	120	120	119
FRS Family	Pearson Correlation	.067	-.240**	1.000**	-.200*	-.177	.195*	-.075
	Sig. (2-tailed)	.468	.008	.000	.029	.053	.033	.415
	N	120	120	120	120	120	120	119
Spillover	Pearson Correlation	-.240**	.343**	-.200*	1.000**	.603**	-.105	.007
	Sig. (2-tailed)	.008	.001	.029	.001	.001	.255	.941
	N	120	120	120	120	120	120	119
Sacrifices	Pearson Correlation	-.323**	.389**	-.177	.603**	1.000**	-.142	-.156
	Sig. (2-tailed)	.001	.001	.053	.001	.001	.123	.089
	N	120	120	120	120	120	120	119
Trust in Operational Safety	Pearson Correlation	.159	-.152	.195*	-.105	-.142	1.000**	.043
	Sig. (2-tailed)	.083	.098	.033	.255	.123	.001	.640
	N	120	120	120	120	120	120	119
Risk Perception	Pearson Correlation	.237**	.042	-.075	.007	-.156	.043	1.000**
	Sig. (2-tailed)	.009	.649	.415	.941	.089	.640	.001
	N	119	119	119	119	119	119	119

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

As can be seen from the table, there were ten statistically significant relationships. The FRS Family has a small, positive relationship with trust in Operational Safety, explaining 3.80% of the variance within the relationship. This indicates that as functioning within the FRS Family increases, the trust that family members have in safety processes and behaviours increases. The FRS Family are the immediate colleagues and associated families of the firefighter. Therefore as the communication, problem solving and coping within that group increases, one inference is that levels of knowledge and perceived effectiveness of safety procedures both increase.

As the FRS Family functioning increases, the level of spillover from the FRS work in to the home decreases. The variance explained by this small, negative relationship is 4%. Suggesting as the perception of spillover from work to home by the relative increases, the FRS Family functioning increases. This might be because if the team is highly functioning there might be fewer causes for spillover in to the individual's home life. However it could also be explained by the perception of spillover being reduced by the increase in knowledge and sharing of their job through the FRS Family.

The positive, small correlation between a relative's perceptions of risk to their firefighter and the relative's reported symptom level of secondary trauma, explaining 5.61% of the variance. One inference to be drawn from this relationship is that as the relative is exposed to experiences which increase their symptom levels of secondary trauma, so their perception of the level of risk associated with the firefighting occupation increases.

The negative, medium correlation between secondary trauma and well-being is predictable given a review of the literature and underlying constructs of these variables. Explaining 10.69% of the variance where higher reported symptoms of secondary trauma are associated with low levels of well-being. As the lower end of the well-being scale predicts psychological dissatisfaction and unease, this would align with experiencing symptoms of secondary trauma as described in the literature underlying these two measures.

The next statistically significant negative, small correlation seen within the table is between spillover and secondary trauma. Explaining 5.7% of the variance, as the symptoms of secondary trauma increase the perceived spillover from the FRS role within the home decreases. One inference from this might be that as the spillover increases and the relative becomes more aware of the details of the job, they build a more detailed understanding of their firefighter's role which in turn provides a context to better understand any traumatic reactions they might display. This could serve to reduce the symptoms of secondary trauma within the relative.

There is also a positive, medium correlation between the Sacrifices Scale and secondary trauma symptoms explaining 10.43% of the variance. As the perceived level of sacrifice decreases so the symptoms of secondary trauma increase. Sacrifices are different to the spillover explored in the previous paragraph. Spillover measures the disruption (both physical e.g. time absent and psychological e.g. emotional disengagement) to home life from the FRS role, Sacrifices Scale measures the amount and intrusion of sacrifices the family have to make to facilitate the role (impact on family life from the way the job is arranged, and the reciprocal relationship the family expects from the FRS – see the factor analysis of this scale in the previous section of this chapter for more detail). If there are fewer sacrifices that the family have to make such as less disruption to family life, then there are more reported symptoms of secondary trauma reported by the relative. One interpretation of this relationship continues from the exploration of the previous correlation. If the family are unaware of the firefighting occupation as the firefighter disengages from their home life to reduce disruption, any traumatic reactions displayed by the firefighter would be confusing in the absence of context needed to understand the behaviour. Therefore their reaction to the behaviour of their firefighter could become more problematic.

There is a positive, medium relationship between sacrifices and well-being explaining 15.13% of the variance. As more sacrifices are made by the family, so their reported level of well-being increases. This relationship could be explained through the families' familiarity with the firefighting role whilst facilitating their firefighters work demands. Conversely, the fewer sacrifices they make, the higher their well-being score due to their perceived increase in flexibility to arrange or influence their lifestyle in the way would prefer. This suggests a disengagement from supporting the demands of the firefighting occupation increases the well-being of relatives; as they perceive that their lifestyle and emotional closeness is influenced less by the FRS role, so their scores for well-being increase.

The relationship between the FRS Family and well-being indicates that as the functioning (problem solving, communication, coping etc) of the FRS Family decreases, so the well-being scores of the relatives increase. This positive, small correlation explains 5.76% of the variance. One inference regarding this relationship is that as the perceived level of support and emotional processing decreases from the FRS Family group, so the interpersonal well-being of the individual relative becomes more necessary. Suggesting the relative may have less ability to draw from psychological resources in the group and therefore becomes more dependent on their own individual resources. As the access to, or effectiveness of, their personal resources decrease, so the individual has fewer effective resources to draw upon to enable their own well-being, so look to the group resources instead, raising their score of perceived group functioning.

The spillover from the FRS role to the home has a positive, medium relationship with well-being, explaining 11.76% of the variance. As spillover increases, so well-being scores increase. This

could be interpreted in a similar context to the relationship between higher spillover and lower levels of secondary trauma symptoms. That is, as the spillover increases and the family is more exposed to the content of the FRS role, so the well-being of the individuals increases as they have a context and understanding of the role. This enables them to manage their own mental health more effectively in relation to their firefighter's occupation.

As more spillover is perceived to occur, so the fewer perceived sacrifices that the family have to make to support the FRS role. This could be explained by the concept of the firefighter becoming a satellite family member with large periods of time and activity where they are absent either physically or psychologically from the family. This is similar to the explanation suggested for the correlation between sacrifices and secondary trauma. If their role prevents them from spending time and taking an active psychological role in their family, then the family would have to make fewer adjustments to accommodate their role as they are engaged less with the family. This correlation between sacrifices and spillover is a positive, large coefficient explaining 36.36% of the variance.

8.16 Multivariate Analysis of Variance

Before further multivariate modelling was completed, an exploration of significance between groups within the sample was completed. Three multivariate analysis of variance were completed in order to establish if aspects of the firefighter's role would be associated with different patterns of response. Length of service, seniority of role and geographical location were used to indicate that relatives had been in contact with the fire service culture and to begin to explore the nature of that culture.

The first analysis of difference was based upon geographical location of the participants. This was due to the culturally specific nature of the Fire and Rescue Service, as some relatives were exposed to the organisational culture of Northern America and others to Europe, a comparison between the scores for these two groups was performed. This is to inform the inferences made from the results of further analysis and to establish if the group could be considered homogeneously. Potential culturally situated influences within the analysis was important to establish in order to align with the Conservation of Resources model which acknowledges the influence of wider groups than the family and communities of people within a similar context.

A one-way between-groups multivariate analysis of variance was performed to investigate cultural differences in the occupational consequences for relatives of firefighters. Seven dependent variables were used (perception of risk, FRS family functioning, trust in operational safety, spillover, secondary trauma, sacrifices and well-being). The independent variable was country of residence.

The Mahal distance suggested that multivariate outliers were not present, matrix plots did not show any obvious signs of non-linearity, Box's test suggested that the assumed homogeneity of variance-covariance had not been violated (.137). Levene's test suggested that the single item variable 'how risky is the firefighting occupation' violated the assumption of equality of error variance. Therefore in line with recommendations from Pallant (2013) and Tabachnick and Fidell (2014), a more conservative alpha of .025 was set for that variable for the univariate F test.

There was a statistically significant difference between country of residence (culture) on the dependent variables, $(7,110) = 2.99$, $p = .006$; Wilks' Lambda = .840; partial eta squared = .16. This suggests there is a statistically significant difference between relatives in Europe and North America within the measures of this study. However when the results of the dependent variables were considered separately, using the tests of between subjects effects, no variables reached levels of statistical significance using Bonferroni adjusted alpha levels. The means between groups can be seen below in the table.

Table 8.16.1 Estimated Marginal Means by Country Type

Dependent Variable	Country Type	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Risk Perception	Europe	3.644	.136	3.374	3.914
	Northern America	4.111	.174	3.767	4.455
Trust in Operational Safety	Europe	14.322	.523	13.286	15.359
	Northern America	13.717	.667	12.397	15.037
Spillover	Europe	17.486	.889	15.726	19.246
	Northern America	19.985	1.132	17.743	22.227
Secondary Trauma	Europe	30.190	.967	28.274	32.105
	Northern America	25.939	1.232	23.499	28.378
Sacrifices	Europe	17.774	.496	16.793	18.756
	Northern America	19.717	.631	18.467	20.967
Well-being	Europe	48.703	1.066	46.592	50.814
	Northern America	50.790	1.358	48.101	53.479
FRS Family	Europe	25.973	.725	24.537	27.410
	Northern America	24.816	.924	22.986	26.646

As can be seen within the table, the only mean scores between the groups are consistent, with the only slight variation being in the scores for secondary trauma. However as previously discussed, there was not a statistically significant difference between groups. When looking at the standard deviations there is a wider spread of scores for Northern American relatives compared to European relatives on their perception of spillover. This same pattern of spread of scores can be seen within comparisons of secondary trauma. However these only give an indication of the nuances within each group's scores, there was no statistical differences. Overall, this suggests that the group can be treated as a homogenous group when completing the multivariate modelling.

Table 8.16.1 MANOVAs Addressing Exposure to Organisational Culture

Variable	Wilk's Lambda	Significant?
Continent of Residence	.840	Significant overall but not at variable level
Length of Service	.940	Non-significant
Rank of FF (Junior vs Senior)	.935	Non-significant

A multivariate analysis of variance was performed for length of service which was non-significant (see table 8.16.1). This measure was taken as an indicator that relatives had been exposed to FRS culture. Time spent in the role by the firefighter could also enable more resources to be gathered and mechanisms rehearsed in order to facilitate effective resource protection for the relatives. The length of service was recoded using the mean for this sample as a point of split. There was no significant statistical difference between the scores of those relatives whose firefighters had a length of service below 21 years, compared to those relatives whose firefighter had a length of service above 22 years. So the hypothesis that time spent in the role (length of service) would enable firefighters to facilitate effective resources for relatives was not supported. It also suggests that length of exposure to the FRS culture does not impact on any measures within this empirical study.

The last multivariate analysis of variance to be completed was designed to explore the differences between relatives' responses of those with firefighters in more junior roles compared to relatives of more senior officers. This was completed using a recoded variable which collapsed responses in to categorical data of 'junior' and 'senior' roles.

This suggests that there are limited differences within the responses of relatives based upon their firefighter's job (such as rank, role and job status). From this it can be assumed that their relatives all have access to the same culture, just at different levels and exposure rates within the organisation.

8.17 Typology of Secondary Trauma

The research questions relating to secondary trauma have been visited in the second empirical study relating to the rejection that emotional contagion provided a satisfactory explanation of the secondary traumatic reactions present in relatives of firefighters. The use of the Secondary Trauma Scale in this current study established (D7) what events do relatives perceive as distressing to firefighters and (D8) what effect do the traumatic reactions of firefighters have on relatives.

The pre-validated Secondary Trauma Scale used by the current empirical study contained an open text response asking for the anchor event which was contextualised in the current study to the firefighting occupation. The question read “Please consider a negative experience or experiences that have happened to YOUR FIREFIGHTER whilst at work and answer the questions below about that experience(s) in relation to YOUR OWN thoughts and feelings. What was the negative experience?”. Participants responses were then analysed using content analysis. This was used to establish commonality between the nature of their responses. The nature and frequency of open text responses is presented in the table below. Information depicting whether each anchor event has been identified in the stress literature of emergency service workers is also captured. Wider parameters were purposefully used in literature selection focussing on emergency service workers as this would encompass more examples of anchor events. Literature focussing specifically on relatives of emergency service workers was not included due to the premise that secondary trauma is linked to the emergency service worker, rather than the relative.

Table 8.17.1 Content Analysis for Open Text Response

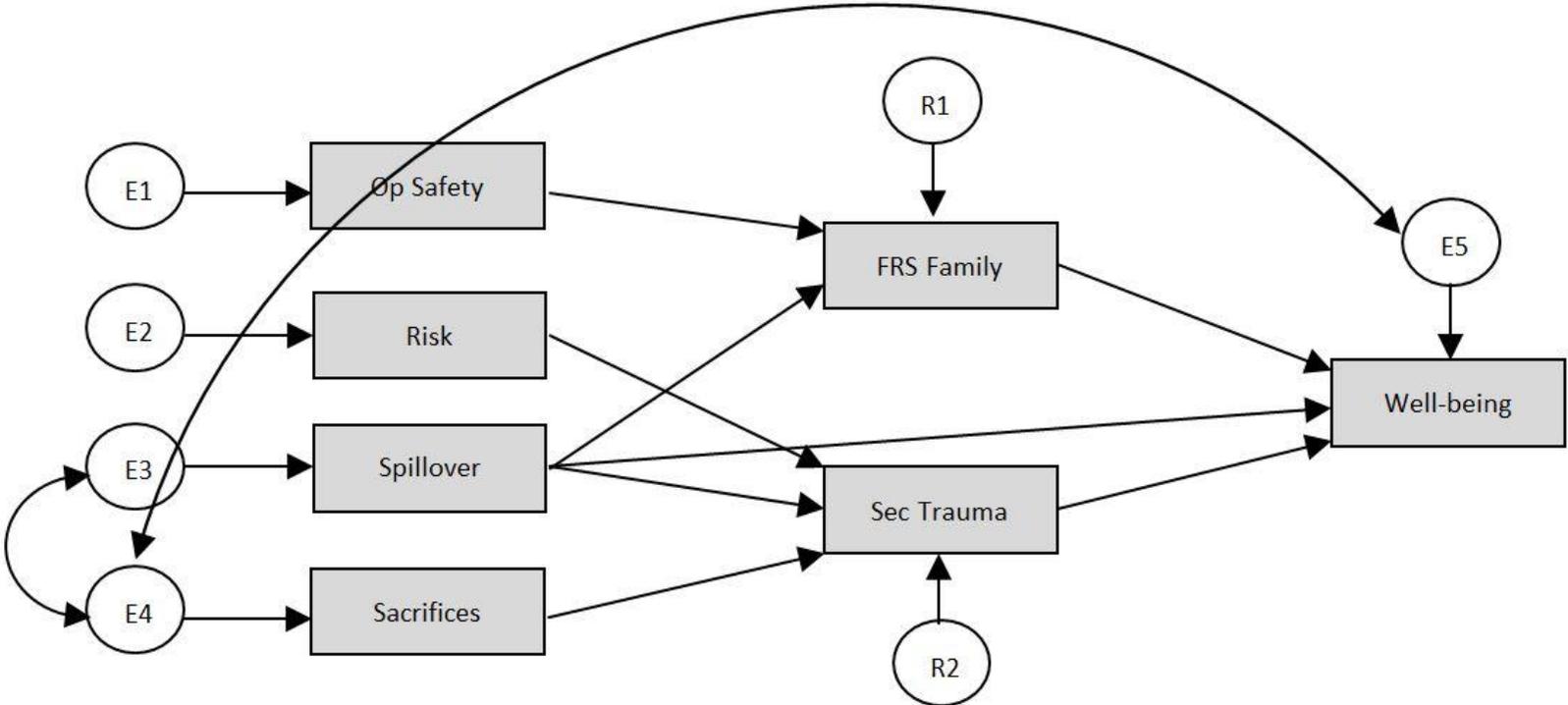
Event	Count	Published in Previous Literature
Injury on job	24	√
Management Injustice	18	√
Injury/Death of Child	16	√
Grotesque Injury/Death of Adult	12	√
Death of Colleagues	8	√
Knowing the Injured	8	√
Strike	8	√
Lack of Support at Incident	7	√
Job Pattern	7	X
Colleague Discrimination	5	X
Colleague using Drugs	1	X

This has some surprising results within the context of the published literature. The literature surrounding secondary trauma in emergency workers mostly focus on experiences such as gruesome injury or death of an adult or child (for example see Beaton and Murphy, 1993; Skogstad, Skorstad, Lie, Conradi, Heir and Weisaeth, 2013). There are three areas within the table which are not previously defined in the published literature as being anchor events triggering a traumatic reaction. Five of the events in the table above would not fulfil the definition criteria of a traumatic event by DSM V (APA, 2013), which involves threat of injury or death to self or others. However the relatives of these individuals are defining these events as traumatic anchors. This will be explored further in the discussion section of this chapter and in chapter nine.

8.18 Multivariate Modelling of Study Three: Path Analysis

In order to explore the relationships within these noted correlations of variables, a path analysis was conducted. In order to achieve this, study three focussed on the structure and causality of consequences of the firefighting occupation on relatives, and to test and explore this model of relationships, path analysis was used. Four exogenous variables (trust in operational safety, risk perception, spillover and sacrifices) were hypothesised to have relationships with secondary trauma and the FRS family, which in turn predicts well-being of the relative. The importance of unidimensional scales, especially for use with smaller sample sizes has been highlighted in previous research (Maruyama, 1998; Anderson, Parmenter and Mok, 2002). Therefore the overall scale scores and not the subscales within the constructs were used as per previous practice within this thesis. The path analysis can be seen below.

Figure 8.18.1 Path Analysis of Study Three



The path analysis was fitted and executed using the AMOS package. The alternative model approach as discussed in chapter four, section 4.7 where the methodology used within this programme of research was outlined. However, only the final fitted model will be reported. The iterative, exploratory process of model fitting went through two other models and took guidance from the fit statistics and theory in order to articulate the structure; producing the final fitted model above. These ad hoc modifications aimed to increase the parsimony of the model whilst capturing the complexity. Maximum Likelihood estimation was used to estimate models. The independence model testing the hypothesis that variables were unrelated was rejected ($\chi^2 = 11$, $N=120$) = 13.19, $p = .281$, suggesting that the model overall and the relationships within the model were statistically significant.

The fitted model summary statistics are as follows: Comparative Fit Index (CFI) = .97, Tucker-Lewis Index (TLI) = .960. These fit indices suggest that the model has good parsimony, when compared to the null hypothesised model (suggesting no relationships between variables within the model). Both these statistics are nearer to 1, suggesting good parsimony, Bryne (2010) suggests after a review of relevant literature that a good cut off point is .95, which both fit indices exceed. The Akaike's Information Criterion (AIC) = 61.193 measures parsimony in context to the number of parameters to be estimated, as such also indicates how the model performs against other models on criteria of both parsimony and complexity. The lower the number the better the model is performing. When the fitted model was compared to other iterated models, this statistic and the related Expected Cross-Validation Index (ECVI) supported this model as the fitted model.

The Root Mean Square Error of Approximation (RMSEA) = .041 was also strong for the fitted model. This measures the model's ability to fit the population when compared with a perfect model, with a larger number (0-1) indicating a greater fit. Tabachnick and Fidell (2014) suggest values lower than .06 are reflective of a good fit, however Bryne (2010) suggests lower than .05. On both directives for a cut off level the fitted model is deemed a good fitting model.

Having secured the fitted model as a good overall model, the causal value of path analysis can now be examined. The table below reports the standardised path coefficients for the relationships between variables within the recursive model fitted model. Recursive in this context means the causal flow goes in one direction through the model; an important criteria for establishing causality within path analysis (Streiner, 2005).

Table 8.18.2 Final fitted AMOS model of Occupational Consequences for Relatives of Firefighters (n=120)

Regression weights	Estimate in raw units	Standard error	P	Standardised (β)
TFRSFam ←TTOpSaf	.247	.124	.046	.177
TSecTrma ← Risk	1.444	.609	.018	.202
TSecTrma ← TSplvr	-.113	.116	.330	-.104
TFRSFam ← TSplvr	-.147	.071	.040	-.182
TSecTrma ← TExcerpt	-.445	.206	.031	-.231
TWllbng ← TFRSFam	-.236	.119	.047	-.163
TWllbng ← TSecTma	-.232	.091	.011	-.216
TWllbng ← TSplvr	.304	.100	.002	.260

The only relationship within the fitted model which was non-significant is the relationship between spillover from the firefighting occupation to family life with reported symptoms of secondary trauma. Every other relationship between variables reached statistical significance.

From examining the standardised regression weights within the table, the predictive, causations between variables can be unpicked further. This offers interpretative power to the correlations identified and discussed earlier in this chapter. These are reviewed starting with the strongest relationship to the weakest relationship. The integration of this causation and the established correlations will be articulated in the discussion section of this chapter.

The presence of spillover from the firefighting occupation into family life predicts a score of wellness. The fewer the sacrifices family members make for the FRS predicts fewer reported symptoms of secondary trauma. More reported symptoms of secondary trauma predict reports of distress (or low well-being). A relative's perception of high risk within the firefighting occupation predicts the reporting of more secondary trauma symptoms. A report of high spillover from the firefighting occupation to the family predicts the perception of a healthy functioning FRS family. If a relative reports low trust in operational safety within the FRS, this predicts higher reported symptoms of secondary trauma. The weakest, significant relationship suggests that a relative with a perception that their FRS family is unhealthy will predict that relative reporting low levels of well-being (more distress).

8.19 Discussion

This chapter has presented a number of findings relating to the meso level of resources pooled by relatives of firefighters. The research questions this empirical chapter has explored include: (C6) how does the experience of firefighters' relatives in Europe compare with the experiences

of those in North America?, (B4) what socio-cultural resources facilitate and maintain the well-being of relatives, (B5) how can the Fire and Rescue Service support relatives to effectively respond to occupational impacts of firefighting and support their firefighter, (D7) what events do relatives perceive as distressing to firefighters, (D8) what effect do the traumatic reactions of firefighters have on relatives. The findings, relevant theory and literature associated with each of these research questions will be examined in turn within this discussion. Accordingly, consideration will be given to development of theory, applications to practice and future directions for research.

Through the first multivariate analysis of variance it was established that there was no statistical difference between European and North American FRS cultures. This is a unique contribution to literature as other studies focussing on relatives of firefighters which have been qualitative have subsequently been situated firmly within the specific organisational culture of that country (Noran, 1995; Regehr, 2009; Regehr, Dimitropoulos, Bright, George and Henderson, 2005; Regehr and Bober, 2004; Regehr, Hill, Knott and Sault, 2003; Pfefferbaum, North, Bunch, Wilson and Schorr, 2002; Kirschmann, 2004). Consequently one original contribution to literature from the current research programme is the clarity that there is no difference between relatives of firefighters across English speaking continents in their reported levels of: wellbeing, FRS family support, secondary trauma, sacrifices for the FRS role, spillover in to the home from the role, perception of risk and perception of operational safety. This enables the extrapolation of research findings across these continents with confidence. Previously, as this body of literature frequently drew on cultural constructs such as the firefighting 'brotherhood' (Kirschman, 2004; Regehr, Dimitropoulos, Bright, George and Henderson, 2005), the extrapolation between contexts was completed with caution by researchers; this can now be done with confidence in future research and debate.

Now that this cross-cultural question has been resolved, this provides future research with the opportunity to design research studies which can use this commonality as an advantage. Opening up opportunities for bigger sample sizes, more detailed research questions and the possibility to model pooled resources used by relatives in other continents. This could enable the development of a general framework of support which every Fire and Rescue Service across English speaking countries could implement.

A word of caution should be offered when extrapolating this literature across countries; it needs to be restrained to the literature focussing on relatives, not the literature on firefighters. For example, literature suggests that coping strategies to maintain resilience might differ between firefighters working in Canada compared to the United Kingdom (Blaney, 2012). These findings could infer that, although the coping mechanisms of the firefighters might differ, the impact of the occupation on relatives is analogous. This highlights the need for literature focussing on firefighters to continue to be extrapolated between cultures with caution, even if there is more latitude in extrapolating the literature focussing on their relatives.

Two other multivariate analysis of variance were completed, none of which reported a significance difference between the groups. Length of service has been suggested in previous studies of well-being and resilience to impact upon emergency responders and their families (Patterson, 2003; Moran, 1998). The finding of this study suggests that the impact upon the family is not present in this sample. This might be because although families perceive there to be a difference in the impacts or their responses to impacts from the occupation over time, it might simply be a normalisation process that occurs. In other words, the process and reactions no longer feel unique, but instead become ubiquitous. Regehr (2009) found that longer career firefighters had lower levels of social support than new career firefighters. She attributed lower levels to the restrictions of the job pattern and changes to family size and shape impacting on firefighter's abilities to access social support. The findings of the current study do not support a change in length of service appraisal by relatives, be that an increase or decrease in resources. However, if evidence suggests a change in the firefighter over the course of their career then the author joins Regehr's call to explore this change further; with a mind to facilitating a positive resource ecology within the Fire and Rescue Service for their employees.

The last analysis of difference between the group responses was between relatives who define their firefighters as having a more senior role compared to those who define their firefighter as having a more junior role. No statistical differences were found between the response patterns of these two groups. Previous research drawing on all three emergency services suggest senior officers are at more risk of psychological harm than junior officers due to the lack of social coping available to them (Brown, Cooper and Kirkaldy, 1996) and due to the intrusion on family life from work, facilitated by technology (Lewis and Cooper, 1999; Voydanoff, 2005). Although evidence has also suggested that there is no difference between ranks (Monnier, Cameron, Hobfoll and Gribble, 2002), the findings of the current study support although the firefighters are feeling a difference as they are promoted, this is not reflected in the relatives' well-being. This offers new perspectives for the work-home interface which should be explored further. Opportunities for future work could contrast the effects over the course of an individual's career to gain a longitudinal view of how these changes are adapted or resisted by individuals within the family.

This discussion will now seek to unpack the relationships identified by the model of well-being and inform the related research questions. The findings of statistically significant associations identified by the model can be clustered to support the notion that as relatives learn more about the firefighting role, their well-being is maintained. As spillover increases, so well-being scores increase. This could occur due to the increased exposure to the content of the firefighting role providing a context, understanding and landscape for the relative to place their firefighter's behaviour, in turn protecting their well-being from threats. This knowledge gain enables relatives to manage their own mental health more effectively in relation to their firefighter's occupation. This could align with the Social Cognitive Theory (Bandura, 1997) suggested to fit with the firefighting occupation by Prati, Pietrantonio and Cicognani (2010). They propose that personal efficacy affords a rescue worker the ability to proactively manage resources to facilitate

successful navigation of stressful events. This could also be applied to the relatives where, as their firefighter gains more efficacy, if they are aware of this, they are able to draw that resource from their firefighter and in to the maintenance of their own well-being (Vandermoere, 2008; Wogalter, Brems and Martin, 1993; Davis, Ricci and Mitchell, 2005).

This unique finding appears to contradict previous literature focussing on relatives of critical occupations. This previous literature (Noran, 1995; Regehr, 2009; Regehr, Dimitropoulos, Bright, George and Henderson, 2005; Regehr and Bober, 2004; Regehr, Hill, Knott and Sault, 2003; Pfefferbaum, North, Bunch, Wilson and Schorr, 2002; Kirschmann, 2004) suggests that the employee protects their family by not talking about their occupational experiences. However, the finding of this research infers that talking about the role, as opposed to the traumatic experiences per se, is the aspect that provides educational and protective value for relatives. This is achieved by ensuring they have a context within which they can normalise reactions and moods of their firefighter.

This interpretation of findings has further support through the negative relationship between perceived level of sacrifice and symptoms of secondary trauma. Such that the fewer sacrifices that the family have to make to family life, the more symptoms are reported of secondary trauma by the relative. If the family are unaware of the firefighting occupation as the firefighter disengages from their home life to reduce disruption, any traumatic reactions displayed by the firefighter would be confusing in the absence of context needed to understand the behaviour. Therefore their reaction to the behaviour of their firefighter could become more problematic. This potential disengagement is supported by literature published on workers in critical occupations (Regehr, 2009; Cowlshaw and McLennan, 2006; Monnier, Cameron, Hobfoll and Gribble, 2002; Regehr, 2005; Regehr, 2001; Basinka, Wiciak and Daderman, 2014). Having contextualised these findings in the wider literature, they support the notion that educating relatives on the role of the firefighter will enable and protect their well-being.

These findings also provide more evidence and context for the notion of the 'satellite firefighter' as defined in study one and two. Previous research has also identified part of this process (Regehr, 2009; Regehr, Dimitropoulos, Bright, George and Henderson, 2005; Regehr, Goldberg and Hughes, 2002; Repetti, 1992; Cowlshaw and McLennan, 2006; Basinka, Wiciak and Daderman, 2014), where a process of disengagement and withdrawal by emergency service workers has been identified. However unlike this study, previous research has not identified confounding consequences of this disengagement beyond the functioning of the family. The findings of the current study suggest that limiting the sharing of information about their role due to their withdrawal from family life, compounds the ability of the family to manage their own well-being and in due course their ability to facilitate the well-being of their firefighter.

This is further supported through the association between high family functioning and the decrease of spillover from FRS work in to the home. One inference of this could be that the perception of spillover is reduced by an increase in knowledge and sharing of the role through

the FRS family. This informal educational support could be facilitating well-being through the mechanism of efficacy, risk reduction and knowledge gain. Developing this chain of impact further, findings suggest that relatives' high perception of risk to their firefighter is associated with the reporting of more secondary trauma symptoms. One inference to be drawn from this relationship is that as the relative is exposed to experiences which increase their symptom levels of secondary trauma, so their perception of the level of risk associated with the firefighting occupation increases and their distress increases. This is mirrored in the finding that reports of low levels of trust in operational safety are associated with higher reported symptoms of secondary trauma.

As functioning within the FRS Family increases, the trust that family members have in safety processes and behaviours also increases. The FRS Family are the immediate colleagues and associated families of the firefighter. Therefore as the communication, problem solving and resources within that group increases, one inference is that levels of knowledge and perceived effectiveness of safety procedures both increase. This might be because the relative has more meaningful contact with their firefighter's colleagues and work environment through their FRS Family, similar to the transfer of knowledge and trust developed within a watch (Hill and Brunsden, 2003; Hill and Brunsden, 2009; Brunsden, Hill and Maguire, 2014). All these findings encourage the sharing of knowledge about the firefighting role with relatives in order to benefit the well-being of both the relative and, in turn, the firefighter. Further to this, perceptions of unhealthy FRS families were associated with low levels of well-being (more distress). These findings, and those above which focus on the FRS family, support the relationship between the interpersonal resources of the individual relative and the wider FRS community. Moreover these findings support the levels of resource pooling as defined by the Conservation of Resources theory (Hobfoll, 1988), specifically the pooling of resources at the meso level. Providing empirical support to evidence the maintenance of firefighters' well-being by their relatives is, in part, dependent on the culture and resources of the FRS community.

The percentage of participants endorsing a perception of safety implies that the level of knowledge relatives have about these procedures is limited. Rundmo (1992) links perception of safety and contingency measures with perceived workload. One inference could be that the relatives perceive a higher workload for their firefighter and therefore a more unsafe environment.

The above clusters of findings all support the notion of sharing role information with relatives in order to reduce secondary trauma symptoms and low well-being (distress). The correlation between secondary trauma and well-being is predictable given a review of the literature and underlying constructs of these variables, as outlined in chapter three, section 3.26. However, evidencing the knowledge gain and education required to facilitate this meso model provides a unique and original contribution to the literature.

Additionally, this provides a clear application for the FRS; encouraging firefighters to share details of their role will facilitate the well-being of their firefighters. This interpretation is based on findings reported as statistically significant within both the correlations and the path analysis. These findings have already been replicated through two different statistical analyses (albeit in the same data set), therefore future research should focus on unpacking and exploring these relationships as a priority.

Lastly, the findings relating to secondary traumatic reactions within relatives clearly indicate a higher than expected prevalence. Given that published literature has established levels of traumatic reactions within a fighting population of 24% in the USA (Regehr and Bober, 2004) and 18% in the UK (Jones, Rona, Hooper and Wesseley, 2006). Meta analyses of global prevalence data suggests levels are generally higher in rescue workers than a lay population (Berger, Coutinho, Figueira, Marques-Portella, Luz, Neylan, Marmar, and Mendlowicz, 2012).

Given these levels in firefighters themselves, 12% of relatives scoring at clinical levels of traumatic symptomology is much higher than expected. After the Oklahoma City Bombings in the USA, Pfferbaum et al. (2002) interviewed 27 wives of firefighters and administered diagnostic scales for PTSD. Half of that sample scored at clinical levels, but that was after a large scale, highly publicised event. The relatives in the current study have not been selected on that basis. One explanation offered is that despite the measure asking for a single anchor event with which the relatives were to base their responses, they actually answered based on more than one event. This has been highlighted as an issue in traumatic research with firefighters (Paton, 2006; Regher, 2009), as a firefighter's career progresses, so is there likelihood of experiencing more than one traumatic event. Accordingly, relatives are exposed to their firefighter's traumatic reactions which in turn may trigger secondary trauma within the relative. The firefighter's reactions may be monitored and processed by their employers, co-workers and relatives, but with the focus on the firefighter, there is little attention paid to the relative, creating a cumulative effect of reactions.

Alternatively, given the arguments presented in chapter three, section 3.22, the macho culture encourages firefighters to down play risks associated with their role (Finnegan, Finnegan, McGee, Srinivasan and Simpson, 2010; Cawkill, 2004). Drawing on the findings from these studies and the patterns of findings surrounding perception of risk within the current study and studies one and two, a possible explanation is offered. Simply that if firefighters are not telling their family about their job and the incidents they have been to, the alternative anchor events recorded by relatives in the tables within this chapter could be misattribution. The relative knows about the context surrounding occupational stress and litigious events, but is not told about the traumatic events. Therefore, the relative will be reacting to the firefighter's reaction to a traumatic event, but the relative will be unaware and misattribute the cause to another, known, source. Future research could try to establish if this is the case by cross-referencing anchor events between firefighters and their families.

8.20 Conclusion to Chapter

This chapter has provided a model of well-being for relatives of firefighters. The model was a good statistical and theoretical fit with the surrounding literature. Findings of research exploring traumatic reactions within relatives suggested two alternative explanations. These will be contextualised and considered further in the discussion chapter. This last chapter will draw together arguments and findings between the three empirical studies, both qualitative and quantitative, and the theoretical evidence from the literature.

Chapter Nine: General Discussion and Integration of Findings

This chapter synthesises and integrates the findings and discussions presented within this thesis. This is structured around the main aims of the thesis in order to locate the integration and provide a comprehensive insight of the occupational consequences for relatives of firefighters.

9.1 Summary of the thesis aims and findings

The main aim of this thesis was to identify and model the needs of relatives of Fire and Rescue Service (FRS) personnel to establish how relatives can be supported in the future. This was achieved by exploring four main aims; identifying the impacts upon relatives, establishing what resources relatives draw on at a macro and meso level to respond to those impacts, exploring the homogeneity of an international sample, and classifying the effects on relatives of traumatic reactions displayed by fire service personnel.

In summary, study one yielded four main findings. Impacts on, and resources used by, relatives of firefighters include; perception of risk, the FRS Family (kin and kith), shared sacrifices and living with traumatic reactions. These have been echoed in research with relatives of firefighters and relatives of other critical occupations. This was then tiered to macro and meso structures for the following studies.

Study two focussed on a macro model of resilience (with predictors of family functioning, personal growth, emotional contagion, perceived physical danger and attitudes to safety). Findings yielded clarity on the debate underpinning the traumatic reactions; the emotional contagion theory was rejected as the route from firefighter to relative. Personal growth and family functioning were the only significant predictors within the model. The social support provided by kin family structures have been detailed throughout this thesis using existing, published literature. However there are three unique contributions which study two offers.

Firstly, the integration between findings and theory to suggest educating relatives on the firefighting role will decrease risk perception. Secondly, the rejection that length of service or age made a difference to this educating, normalising process; only length of time living with the firefighter (or exposure) changed the nature of the responses. Emotional contagion and fatalism was significantly different between relatives who had lived with their firefighter for a longer period of time, compared to those who had lived with their firefighter for less time. This was aligned to established theories of cognitive appraisal, risk perception and knowledge and provides evidence for how the increase in education of the firefighting role can reduce perception of risk.

Thirdly, the rejection put forward by the work-home interface literature that working patterns have an impact on the work-home interface. Despite the fondness for specific shift patterns

expressed in study one. It is posited that due to the development of the satellite firefighter/family member, the working patterns become irrelevant to the domain of home for firefighters.

Study three modelled meso (cultural, organisational and societal) structures which protect or threaten relative's well-being. This model was significant. Other than being the first research programme to attempt to develop this model, this study also offers three further unique contributions.

Firstly establishing an indicative prevalence level and typology that secondary trauma develops in relatives in response to the firefighter's reaction to a traumatic event. In addition to this, the second unique contribution also suggests that encouraging the firefighter to disclose what they might be reacting to, will empower relatives to manage their own reactions by contextualising and normalising the reactions of the firefighter. Lastly, findings enabled the rejection of the assumption that differences exist between the relatives of firefighters in Northern America and relatives of firefighters in Europe and between relatives of firefighters in more senior ranks compared to those of firefighters of lower ranks.

These overarching findings aligning to each research question will now be reviewed in more detail, extracting relevant findings across the empirical studies of the thesis.

9.2 Establishing the Occupational Impact of Firefighting on Relatives

Two research questions were used to establish the impact upon relatives of the firefighting occupation. Firstly, the impact and effects of those impacts were identified through a qualitative empirical study. Study one identified: families making sacrifices to facilitate the firefighting role (including shift work), families appraisal of the impact of physical risk, the identification and positive impact of the FRS family and lastly the families management of traumatic reactions displayed by their firefighter. Pervasive throughout all of these impacts was the relatives' efforts to protect any children from these impacts. In summary, the impacts for relatives from the firefighting occupation anchor to threats to their well-being and resilience, disruption to family daily routines creating a satellite firefighter, and threats to the firefighter's well-being.

The second research question within this aim was to establish the mechanisms by which these impacts affect relatives. Findings from all three empirical studies in this programme of research consistently demonstrated the benefits of normalising, knowledge gain and shared identity. This programme of research has aligned findings elicited using both qualitative and quantitative methods, and drawing across different samples. This is a strong message as it suggests that triangulation has been achieved within this thesis and infers that findings are reliable. These consistent findings across this thesis will now be considered.

The use of knowledge gain was pervasive, suggesting that increasing relatives' knowledge about the role has significant benefits; not only contextualising traumatic reactions of the firefighter, but also ensures that relatives can increase their own resilience and well-being. This

process of increasing the knowledge of the firefighting role changed relatives' representation and processing of risk and is explained through the Protection Motivation Theory (Martin, Bender and Raish, 2007). Through the findings within all three empirical studies, it was evident that emotional contagion was active within this process of perceived risk reduction, not in the gain of traumatic reactions. A second aspect for knowledge gain is length of exposure to the impacts for the relative, not length of firefighters' service as would naturally follow from previous literature (Patterson, 2003; Moran, 1998). Responses of relatives who have lived with their firefighter for fewer years were statistically different to the responses of relatives who have lived with their firefighter for a greater number of years. The process of normalisation of risks has been explained within this thesis through relatives altering their perception of how much control their firefighter has in their work place and the resulting changes in fatalism. This has informed Leiter and Cox's (1992) model of appraising occupational risk.

The empirical studies presented in this thesis infer that knowledge gain was partly delivered through the FRS family; however, it was also clear from this programme of research that this family structure also provides another essential role, that of normalising the occupation-related situations relatives of firefighters find themselves in. Findings from study one suggested that relatives feel the FRS do not recognise their sacrifice, so this shared identity facilitates reassurance for relatives of firefighters. Sharing strategies in managing work spillover and traumatic reactions is important not only to 'upskill' relatives of firefighters, but this also provides reassurance and context within which the relative can locate their experiences. The sharing of strategies ensures relatives can adequately monitor and facilitate the well-being of their firefighter, another aspect that pervaded the empirical findings of this programme of research.

Relatives actively monitor the resilience and well-being of their firefighter as evident across all the empirical studies of this programme of research. This intentional management is followed by proactive facilitation of the firefighter's typical coping strategy should the relative feel it necessary to maintain the resilience and well-being of their firefighter. This was described by relatives in study one and echoed in findings relating to increased emotional contagion over time spent living with the firefighter and the family functioning resource. Evidence for this active monitoring by relatives to maintain resilience was offered within the study of macro resources. This will now be discussed in the following section of this chapter.

9.3 The Intrapersonal Macro Model of Resilience

This model was designed to investigate the relatives' responses to impacts at the macro level, including resources used to facilitate and maintain the resilience of relatives. The research question unpacked this structure of resource in order to detail the responses relatives have to occupational consequences of firefighting. Initially the intrapersonal resources were identified that relatives of firefighters draw upon to respond to those impacts. These were identified as resilience, perception of physical danger, fatalism, emotional contagion and growth. Once these were identified, the family resources which relatives of firefighters use to respond to impacts were identified as the family functioning facets of the McMaster Family Assessment Device by

Epstein, Baldwin and Bishop (1983). This includes problem solving, communication, roles, affective responsiveness, affective involvement, and behavioural control.

These identified factors were then modelled in order to investigate what resources aid the resilience of individual relatives. The model was statistically significant with the predictors explaining 36% of variance within resilience, only growth and family functioning made a statistically significant contribution to the prediction of resilience.

These findings, along with the findings from the other studies in this programme of research suggest that the firefighter's family is used to increase resilience within family members to maintain resilience when impacts occur from the occupation. These findings lend support to the application of Conservation of Resource theory to relatives of firefighters. Families pool their intrapersonal resources and create family resource reservoirs where resources are 'substituted or replaced' in order to maintain the resilience of family members (Hobfoll, 2001). Hobfoll acknowledges that intrapersonal and family resource caravans are likely to be available to the same individual throughout their lifespan. It can therefore be predicted that these resources will be consistently available to the relatives for their lifetime, rather than a temporary observation as a product of snapshot methodology. The limitation of the methodological approach only offering a simultaneous measurement of the model, rather than a time lag to determine causality and reliability, is addressed through the underpinnings of this theoretical model. The theoretical model dictates the chronic nature of the resources, which in turn means that the resources being explored and measured in the empirical studies are stable clusters for this participant sample. Therefore this programme of research offers a definitive group of relevant resources for relatives of firefighters. This enables future research to focus on these resources and structures to further investigate their dynamics and effectiveness.

Findings from study one and study two suggest that within the family structure, the firefighter becomes a satellite family member. This is attributed to their shift pattern and/or psychological withdrawal due to distressing experiences at work. This is responded to by the family through a range of resources. The former, unexpected nature of the work pattern can be normalised through the FRS family. The latter, psychological withdrawal, can be contextualised through knowledge of the role.

9.4 The Interpersonal Meso Model of Well-being

This modelling of well-being resources was designed to unpack the meso level of impacts identified in study one. That is, the resources pooled between individuals and those which are associated with facilitating and maintaining well-being. The research questions aimed to explore and quantify the responses of relatives to impacts at the meso level (B4), included cross-continental data (C6). Experience and prevalence of impacts were compared between relatives of firefighters in Europe and those in North America. The anchor events of secondary trauma were examined (D7), establishing a typology (D8) and prevalence for this phenomena within relatives of firefighters established for the first time.

Findings suggest that participants recruited from different countries and continents can be viewed as a homogenous sample as there were no differences in the way that they responded to any of the scales. Therefore the initial research questions are resolved, but imperatively for this thesis, it enables the integration of the findings from all three studies within this discussion chapter as the participants were not drawn from one sample.

Integrating the findings between study one, two and three it is clear that relatives of firefighters perceive that their management of their own well-being increases with time. From the multivariate analysis of variance this programme of research has demonstrated that this time period should be defined as the length of time a relative has lived with their firefighter; not the length of firefighter's service, or the wisdom which develops with the increasing age of the relative, as previous literature has suggested (Patterson, 2003; Moran, 1998). Instead, the normalisation of consequences, the increased knowledge of the firefighting role, and the sharing and practicing of strategies to cope with the demands on the family, become more effective over the time they live together. This could also be attributed to the FRS family which clearly has specific membership and purpose of support.

Within study two findings suggested a clear link between relatives increasing their knowledge of the FRS role and beneficial outcomes for them individually. Study three also echoed these findings indicating that as knowledge of the firefighting role is facilitated, relatives can manage their well-being and resilience to enable themselves, their family and their firefighter. Sharing information reduces secondary trauma and has a positive impact on levels of well-being. Finally findings were synthesised to suggest ways in which the Fire and Rescue Service could support relatives to positively respond to those impacts, in an effective way in the future. This is unpacked fully in section 9.6 within this chapter.

9.5 Implications for Theory

Findings throughout this thesis suggest that a new contour should be developed within the work-family interface. Families of firefighters clearly protect their home life from the disruptive influence of their firefighters work pattern. The findings from the current research has demonstrated this is done through the firefighter becoming a satellite family member. Orbiting the families everyday activities, ensuring they are not emotionally, practically or psychologically essential to allow the development of normality. This disengagement has been seen in other literature (Regehr, 2009; Cowlinshaw and McLennan, 2006; Monnier, Cameron, Hobfoll and Gribble, 2002; Regehr, 2005; Regehr, 2001; Basinka, Wiciak and Daderman, 2014). However, whereas they focussed on emotional disengagement, the current study calls for more research to examine this role of a satellite family member.

The current research also calls for more research to be completed in the area of work-home spillover, to establish the potential further benefits of spillover for the relative. Findings of this study suggest that as spillover increases, and the family is more exposed to the content of the

firefighting role, so the well-being of the individuals increases as they have a context and understanding of the role. This knowledge gain enables relatives to manage their own mental health more effectively in relation to their firefighter's occupation. The possible process supporting this is detailed in chapter eight, section 8.19. However, more research evidencing this process would advance our knowledge further.

This thesis has contributed to the understanding of how Conservation of Resource theory and theories aligned to those resources integrate. Resources aligned to the different social and cultural structures have been explicated further using the context of the Fire and Rescue Service work-home interface. As outlined on chapter three and chapter six, there were theories which did not conceptually fit with the findings from study one. Accordingly there were no instances where integration was unsuccessful. This was surprising given the unique nature of the context and situation of the sample population. An original contribution to literature has established the homogeneity within this unique population. This suggests that theories and findings can be extrapolated across research conducted between different continents.

Lastly, a new research focus has developed from existing theory. One explanation of knowledge gain reducing the impact of threat might be because the relatives have more meaningful contact with their firefighter's colleagues and work environment through their FRS Family, similar to the transfer of knowledge and trust developed within a watch (Hill and Brunsden, 2003; Hill and Brunsden, 2009; Brunsden, Hill and Maguire, 2014). Therefore, the current models of social support within critical occupations has been extended to the relatives' social support for each other. This should also be a future direction for research.

9.6 Implications for Practice

It has been clearly established from the current programme of research that the occupation of firefighting impacts on the family members of the firefighter. Families can be seen as working for the employer due to the role they occupy diffusing and debriefing their relatives, buffering health issues and thereby promoting employees capability. The need for a congenial home life is beneficial to the employee, as it is where they obtain their primary source of social support, but is also of great benefit to the employer. The social support that relatives provide is an essential part of increasing and maintaining resilience, reducing stress, and maintaining occupational effectiveness. Therefore the following section outlines practical implications from the findings, all of which are developed to enable the organisation to develop a positive resource ecology (chapter three, section 3.27).

Implications for the FRS include the development and delivery of messages to prepare relatives for the associated impacts of the firefighting occupation, with the explicit aim of minimising their effects. The armed forces and also some FRS in different cultures (such as Australia) already include this as part of the initial training stages. The messages are then nuanced as the firefighter progresses and their role changes with career progression. This allows for self-

management of families through their preparation and normalisation of impacts, if and when, they occur.

The fire and rescue service community could also develop reliable, credible resources to support families should they need advice. These could be stored on a known website (such as the armed forces have) for the families to seek reassurance, guidance and knowledge to enable their management of their own situations. A suggested trusted website in the UK would be the Fire Fighters' Charity.

These results can also inform and contribute to the evidence base of support mechanisms for firefighters. Differences in how length of service impacts upon firefighters social support mechanisms (Regehr, 2009) but not the family, has implications for the details within those targeted messages outlined above. The family needs more support the longer they live with their firefighter, but the firefighter might need more support as their length of service increases. This would mean the support resources within that supportive structure would be drawn upon and offered at different points. This has further implications for the perceived protection of the pooled/reservoir of resources, their gain and their loss within an FRS family.

Facilitating the knowledge of the work, consequently reducing the perception of relatives' risk, encouraging peer social support between relatives and also between firefighters is to invite the relatives to station for open/training days. This way the relatives can strengthen their connections between each other as well as immerse themselves in a knowledge context of the work of their firefighter.

By actioning the above measures the Fire and Rescue Service could facilitate a resource rich caravan for individual FRS families and families of their employees accordingly. Investing in the human capital of the organisation (DeCuyper et al., 2012; Westman et al., 2005; Helbesleben, et al., 2014) is just as valuable if the organisation can enable employees and their families to protect from resource loss, rather than aiming to increase gain and establish a strong resource ecology (Hobfoll, et al., 2012).

Supporting the monitoring and proactive coping relatives complete for their firefighters reduce behaviours in firefighters such as drinking to cope (Bacharach, Bamberger and Dash, 2008) demonstrating the value to the individual, the family, the watch, the FRS family and the organisation.

9.7 Future Directions for Research

One clear direction for future research in this area concerns the finding that relatives actively monitor their firefighter and facilitate their resilience and well-being. To develop this unique contribution to literature it should be explored further to see if this actually benefits the firefighters in the way that relatives perceive. From previous literature it is clear that social support benefits the well-being and resilience of firefighters. Future research should determine if

active monitoring and coping for another person have similar benefits to the social support, or if this activity generates a benign or damaging impact on firefighters.

Future research should also focus efforts in capturing and determining the underlying cognitive and social processes and dynamic relationship between: increased emotional contagion, increased perceived control of firefighters, increased family functioning and the resultant increase in resilience of relatives. Determining this process will provide opportunity to encourage this process to enhance the available resources available to relatives, and in turn, the resources available to firefighters.

Having established the new contour between the research of work-home interface and emotional disengagement, the nature and role of the satellite family member should be attended to in future research. Establishing the impact of this role on the facets of family functioning would illuminate ways in which this role is beneficial and costly to the family. Research evidencing the process which enables knowledge and education of role to inoculate against potential threats would advance knowledge further than this thesis has been able to do.

9.8 Limitations

Whilst some literature has argued that well-being and resilience is aligned with certain personality factors (Wood, Joseph and Maltby, 2009), this thesis was clearly focussed on establishing and exploring group level commonality between relatives of firefighters. This group focus was completed at the exclusion of individual differences such as personality factors. This aligns with previous literature that has also prioritised the exploration of a group within a cultural context over the individual (Burns, Anstey and Windsor, 2011; Maheswaran, Weich, Powell and Stewart-Brown, 2012).

Multivariate analysis of variance (MANOVA) was chosen to test for difference between the groups for a number of reasons. Firstly a test of difference, rather than relationships, was sought. Therefore a need to compare the scores between groups was identified. This aligns with previous research within the emergency services context when comparing groups based on these demographic splits (Monnier, Cameron, Hobfoll and Gribble, 2002; Prati and Pietrantoni, 2010; Alexander and Klein, 2001; Alexander, Kemp, Klein and Forrester, 2001; Zimmerman, Terence, Gerace, Smith and Benezra, 1988; Regehr, 2009; Regehr, Goldberg and Hughes, 2002). On all significant findings a further independent samples T test was completed on those variables and the same patterns of statistical significance was returned.

Researchers suggest that theory should be used to provide support for a theoretically meaningful relationship between the dependent variables (Field, 2009; Cohen, Cohen, West and Aiken, 2003). This prerequisite is essential in completing a MANOVA and is addressed in this thesis through the development of the model from study one. Field (2009) suggests that this test offers the advantage of overcoming type one errors by reducing the familywise error rate. Additionally, MANOVA has greater power to detect an effect than testing different relationships

with ANOVAs. Tabachnick and Fidell (2014) suggest that a criticism of MANOVA is that it has reduced power, but that this does not become realised as long as there are more cases than dependent variables per cell. Within this thesis, there are more cases than cells where these tests have been used (the lowest ratio was 24 cases, 5 dependent variables). Within this thesis the correlation tables have been included in the analysis sections to demonstrate that the correlations in most cells will be high and positive, which Tabachnick and Fidell (2014) suggest increases power. They also suggest the test is appropriate when standard deviations and histograms show a norm distribution of data. The histograms were inspected for this thesis and deemed appropriate for this test of difference. To ensure the appropriateness of the MANOVA a test for outliers was completed and used to direct alterations to the data set (Tabachnick and Fidell, 2014). Wilks' Lambda was used to test for robustness rather than Box's M test to account for the unequal sample sizes (Tabachnick and Fidell, 2014; Pallant, 2013).

Relating to the MANOVAs within this thesis, the sample were categorised using a mean split. Some researchers advocate a median split (Pallant, 2013) in order to achieve equal distributions in each group. The same analysis was performed using the median split and the same pattern of findings were returned. The meaning of performing the split was to test the difference between two meaningfully categorised groups. Splitting them based on their sample size, rather than the construct itself (the independent variable), lacks theoretical meaning (Carson, Peterson, and Higgins, 2003). However the process to consider outliers within this thesis meant that the means and medians were very similar throughout the data, explaining the same pattern of findings for the analyses on both the mean and median. Consequently the mean split was used throughout this thesis.

Further considerations which existed at a theoretical/philosophical level of method was the decision not to use the technique of bootstrapping. This is due to the underlying assumptions of the technique; that the original sample is considered to represent the population. The means reported in the empirical chapters indicated the scoring of this sample; they suggest that for some measures this sample is different to the population. For example, the high prevalence of reported secondary trauma symptoms (see study three, chapter eight, section 8.17). Therefore, using the technique would potentially lead to misleading inferences (Bryne, 2010). It was decided not to use this technique.

It needs to be acknowledged that whilst this research took place, there was a period of continued industrial action taken by firefighters. Between September and December 2013 and June and August 2014 the Fire Brigade's Union (FBU) called for isolated days of strike action. Although not the direct participant group, this will undoubtedly have influenced the responses, participation and receptivity of the research amongst the firefighters and their participants. The response rate was affected as the method of recruitment was to go through the Fire and Rescue Services' to the firefighters and then have them pass the recruitment opportunities on to their families in turn. This additional activity in the lead up and period of withdrawing their labour

is likely to have disrupted that chain, and the data collected during this time was also influenced by this period of unrest (as reflected in the data offered in the open-ended questions).

A second largely disruptive factor was also present in the later stages of this thesis; the Fire and Rescue Services themselves began to withdraw support from the research due to a legal ruling. The verdict from a court case focussing on an incident in East Sussex in 2006 ruled in 2013 that families of the firefighters who lost their lives whilst attending that incident were owed compensation by the Fire and Rescue. This caused the Fire and Rescue Services around the UK to reconsider their duty of care and responsibilities to the families of their employees. Consequently, some FRS approached this research with a view to protect their organisation. Some did not engage or support this research, refusing to send it out for their employees to pass on to their family members.

Although frustrating, both of these incidents are a result of working with an occupation in the real world. This thesis instead had to bend and flex in order to accommodate the changes in commitment/support and address the challenges they brought with them.

9.9 Overall Strengths of Thesis

This thesis has a number of strengths to be considered alongside the limitations. These will be explored in turn with reference to sections of the thesis which evidence these strengths.

Throughout the thesis the researcher has taken extensive steps to ensure that the research methods and analyses used were applied appropriately within the context that the study was taking place within. One example to illustrate this is the careful consideration of missing data in studies two and three (sections 7.9 and 8.8). Although this resulted in a lower sample size, the appropriate statistical considerations were made (such as Bonferroni adjustments in the MANOVAS and Adjusted R Square in the regression analysis). By applying caution this thesis has ensured the integrity of the inferences from the analyses.

The thesis draws across a variety of literature to contextualise and inform the findings. The literature was systematically reviewed using three key points of selection/attrition criteria. Firstly the literature had to contribute to the explanation or interpretations of findings from study one. This was reviewed using the main and peripheral categories within the analysis section of study two (chapter 5, section 5.7). The second point of attrition was that with the family functioning, risk, work-family interface, resources and resilience literatures were selected based upon the research design gaining data from an individual. This meant that literatures focussing on multiple perspectives of a unit/group/family were considered and discarded due to the limited ability of this research to contextualise the findings. The final point of attrition of the literature was the 'response to another' that the research took throughout. In other words the research was mostly asking the participants about their perceptions relating to their firefighter, not of themselves. For example literatures relating to individuals evaluating their own risk perception were not appropriate to draw upon without careful consideration in this context.

The overall approach of the thesis has two further clear strengths. Firstly the sequential, mixed methods approach ensures that the phenomenon has been examined from different positions ensuring the consistent findings build between methods and are robust. Rather than simply being two approaches bolted together without any sequential development between them. Secondly the thesis was cognisant of the cultural context of the phenomenon, ensuring that the structures, groups and norms of the participants were explicitly acknowledged. If this were not considered, then the research would lose its explanatory power and the potency of its application. These two things together resulted in a robust and contextualised piece of research with strong academic integrity.

The application of the findings works within the existing structures, groups and norms of the relevant participant and organisation domains. The solutions suggested by this thesis do not include the development of resource intensive interventions. Clear and achievable recommendations have been presented which will develop a positive resource ecology as suggested within the existing structures and groups which should increase well-being and resilience of relatives and in turn increase the social support of firefighters.

In summary, this thesis has many overarching and specific strengths, however the main implicit strength is the access to hard to reach participants. Given the literature outlining the many ways that families support firefighters, this thesis has managed to secure meaningful data from this group; generating findings which inform and contribute to theory, practice and application.

9.10 Contribution of Thesis to the Research Area

In summary, this thesis has clearly evidenced original contributions to the research area. Chiefly, through establishing:

- research approaches to examine the experience of families in the area of the work-home interface
- a detailed model of occupational impacts on relatives of firefighters
- a new contour within the work-home interface literature by capturing and defining the firefighter as a 'satellite' family member
- the protective effect of the satellite family member in response to unusual working patterns
- resolution of the typology and prevalence of traumatic reactions passed on to family members of firefighters
- ways in which the firefighters can protect resilience and well-being in their own families by educating them on their role and notifying them of traumatic events
- the ways in which that education process occurs
- homogeneity between European and Northern American populations of relatives of FRS personnel
- the rejection of impact from length of service and acceptance of length of time lived with firefighter as an influential factor for relatives

- practical methods to develop a positive resource ecology within the fire and rescue service community; building resilience and protecting well-being

The detailed nuance of how these have been established has been the main foci running through this thesis.

9.11 Conclusion

Having made an original and significant contribution to the research areas of well-being, resilience, Conservation of Resource theory, familial social support of critical occupations, work-home interface, perception of risk, family functioning, and traumatic reactions, this thesis has clearly advanced knowledge and understanding in these areas.

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Appendices

Appendix 1

Study One Interview Schedule

1. Could you start by telling me a little bit about yourself? Just so I know who I'm talking to?
2. And can you tell me a bit about your loved one(s) who's in, or been in, the fire and rescue service...?
 - a. and what's your relationship to them?
3. So can you describe to me what it is like with them being in the FRS please?
 - a. Pragmatically
 - b. Emotionally
 - c. How do you feel about this?
 - d. Is there anything about it that stands out as particularly positive or negative?
 - i. Can you give me some examples
4. As a relative of a firefighter can you describe any direct relationship you have with the FRS?
 - a. Can you tell me a bit about that...
 - b. Can you give me some examples...
 - c. Is there anything about it that stands out as particularly positive or negative?
 - d. Can you give me some examples
5. Could you tell me about any career changes/ promotions your loved one has had within the FRS?
 - a. Has this affected his hours? Responsibilities?
 - b. How do you feel about this?
 - c. How it's impacted on you/the family etc.
6. Could you describe the shift patterns your firefighter has completed?
 - a. If yes, how do you think this has impacted on you?
 - b. On your relationship with your loved one?
 - c. On their relationship with others/the family/friends
7. Could you tell about how your firefighter's work has impacted on your own work at all?
 - a. Positively?
 - b. Can you give me some examples
 - c. Negatively?
 - d. Can you give me some examples

- e. Is there a difference in perception about the relative importance of your jobs/roles
 - f. How do you feel about that?
8. The FRS recently went through a big modernisation process. Can you describe any ways in which this has had any direct impact on you?
- a. Can you give me any examples
 - b. What about indirectly through your loved one's reactions
 - c. Can you give me any examples
9. I'm going to start to ask you some more sensitive questions now, are you comfortable to continue? The FRS is often portrayed as a dangerous occupation – how do you feel about that?
- a. Does it tally with your experiences?
10. Please could you describe any major incident(s) that your firefighter has been involved in?
- a. Can you tell me a bit about that?
 - b. How did you hear about it/get updated?
 - c. How do you feel about that?
 - d. What kinds of support did you get?
 - e. Can you give me any examples
 - f. What about from the organisation/FRS support/lack of support?
 - g. Can you give me any examples
11. Can you tell me about the ways in which your firefighter discusses their job with you?
12. Problems?
13. Achievements?
- a. How do you feel about this?
 - b. Does it affect your relationship?
 - c. In what ways?
14. Can you tell me about any social activities you get involved with through the FRS
- a. Charity events etc.?
 - b. mixing with other relatives?

Thank you

Appendix 2

Study Two Questionnaire

Removed for copyright reasons

Appendix 3

Study Three Questionnaire

Removed for copyright reasons

Appendix 4

Conference Publications from this work:

Hill, R. (2015). Investigating occupational impacts of the firefighting occupation on relatives and families. Presented at BPS Annual Conference. Liverpool, May 2015.

Hill, R. (2014). Investigating Occupation-Related Consequences for Relatives of Fire Fighters and Implications for Service Managers: Full Findings. Presented at Annual Conference on Fire Research and Related Developments (RE14). Moreton In the Marsh, Gloucestershire, November 2014.

Hill, R. (2013). Investigating occupation-related consequences for relatives of fire fighters and implications for service managers. Presented at Annual Conference on Fire Research and Related Developments (RE13). Moreton In the Marsh, Gloucestershire, November 2013.

Hill, R. (2012). The Family Perspective within the Work-Family Interface: the Dynamic, Monitoring, Supporting and Proactive Family. Presented at the Alternatives Futures Conference, Nottingham, February 2012.

Hill, R. (2008). Investigating occupation-related consequences for relatives firefighters: Initial findings. Presented at the PsyPag Annual Conference. University of Manchester, Manchester. 30th of July – 1st of August 2008.