A conceptual exploration of psychological distress following mild to moderate traumatic upper limb injuries

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Abstract

Psychological distress following severe traumatic hand injuries is common and has a significant influence on enduring disability and pain. In many studies, this distress is measured as symptoms of anxiety disorders such as post-traumatic stress disorder and generalized anxiety disorder. However, the portrayal of psychological distress as a compilation of symptoms of anxiety disorders may not adequately describe the psychological distress experienced by those with less severe injuries. In this thesis, I explore the concept of psychological distress following mild to moderate traumatic upper limb injuries.

The research presented in this thesis utilised a mixed methods approach. Study I involved the investigation of three forms of recovery-related anxiety (pain anxiety, state anxiety, and post-injury anxiety) and one form of general anxiety (trait anxiety) in 84 individuals following mild to moderate traumatic upper limb injuries. Recovery-related anxiety was common in this sample. In a multivariate regression model, the four predictor variables (pain anxiety, state anxiety, trait anxiety and post-injury anxiety) accounted for 29% of the between-person variability in disability; however, post-injury anxiety was the only significant independent predictor of disability (19%). Correlational analysis revealed that post-injury anxiety was distinguishable from the other forms of anxiety measured in Study I, and that it most closely resembled the concept of psychological distress in health literature.

Studies II and III, therefore, focused on the exploration and development of psychological distress following traumatic upper limb injuries as an independent concept. Study II, an Evolutionary Concept Analysis, explored the portrayal of psychological distress following traumatic upper limb injuries as a concept in its own right within the traumatic upper limb literature. A working definition of psychological distress as a non-pathological emotional reaction to injury was developed and characteristics, related concepts, antecedents, and consequences were defined. Although frequently found in the literature related to traumatic
upper limb injuries, psychological distress was rarely used as an independent concept, serving instead as a categorical label to encompass a wide variety of related concepts. In order to be useful as an independent concept in this context, psychological distress requires further development.

Initial steps toward this conceptual development were undertaken in Study III. Using semi-structured interviews, the experience of psychological distress following traumatic upper limb injuries was explored with 11 individuals who had recently sustained mild to moderate upper limb injuries. Thematic analysis found that the four sources of psychological distress were: 1) uncertainty about issues such as future function, 2) disruption to daily life and roles, 3) questions relating to legitimacy, and 4) impact on identity.

Taken together, the results of the three studies suggested that the prevalence of context-specific psychological distress following traumatic upper limb injuries was high. In addition, this form of psychological distress may be considered a concept distinct from those of general or recovery-related anxiety. Approaching psychological distress as an independent, context-dependent concept may provide insight into the psychological experience of patients following mild to moderate traumatic upper limb injuries that is not made apparent by measuring isolated symptoms of anxiety disorders.
Acknowledgements

This thesis represents the culmination of a number of different journeys for me. I would like to express my heartfelt appreciation to those people who made these journeys possible for me.

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Second, I would like to thank the participants from Studies I and III for sharing their experiences and their time. In particular, the 11 men and women who sat down with me and talked about what for many had been a distressing experience have my gratitude. Without their input, this project would not have been possible.

I would also like to acknowledge the Disability Research Placement Program of the New Zealand Health Research Counsel and the University of Otago for providing funding for this thesis.

There are two hand therapists in the Dunedin area, Miranda Buhler and Alison Derbyshire, who also deserve a mention for the time they spent listening to my ideas, providing feedback on questionnaire items or sources of distress, and sharing their experiences as hand therapists. Their advice served to keep me grounded in why I wanted to complete this project in the first place.

Finally, I would like to thank my family for their patience, love and encouragement. To my son Jaden, thank-you for providing a fabulous distraction when I needed it the most. And to my husband Jon, your encouragement, unwavering faith, and love were a source of strength during the difficult patches while your willingness to share your time, knowledge, and childminding duties allowed me to reach the end of my journey.
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# Glossary of terms

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<th>Term</th>
<th>Definition</th>
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<tr>
<td>Accident Compensation Corporation (ACC)</td>
<td>New Zealand’s government funded, no-fault insurance scheme for accidental injuries incurred by New Zealand residents, citizens, and visitors to NZ (see footnote, chapter 2)</td>
</tr>
<tr>
<td>Activity limitation</td>
<td>Difficulties an individual might have in executing an action or task due to functional impairments (World Health Organization, 2002)</td>
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<tr>
<td>Acute Stress Disorder</td>
<td>A form of anxiety disorder defined by the DSM-IV that includes the development of symptoms including intrusion symptoms, negative mood, dissociation, avoidance and arousal following exposure to a traumatic event. Symptoms develop and resolved within 3 days to 1 month following event (see Chapter 2)</td>
</tr>
<tr>
<td>Amputation</td>
<td>Removal of part or all of a body part that is enclosed by the skin through surgery, trauma, or restriction (MedicineNet, 2015)</td>
</tr>
<tr>
<td>Anxiety</td>
<td>Anticipation of future threat (American Psychiatric Association, 2000)</td>
</tr>
<tr>
<td>Anxiety disorder</td>
<td>As used in this thesis, &quot;anxiety disorder&quot; refers to anxiety forms similar to those that are described in the DSM that are focused on more extreme manifestations of somatic or cognitive symptoms</td>
</tr>
<tr>
<td>Anxiety sensitivity</td>
<td>Fear and avoidance of anxiety-related sensations (Keogh, Book, Thomas, Giddins, &amp; Eccleston, 2009)</td>
</tr>
<tr>
<td>Biomedical Model (Medical Model)</td>
<td>Model of illness which postulates that all symptoms of disease arise from an underlying physical abnormality within the body</td>
</tr>
<tr>
<td>Biopsychosocial Model (BPS)</td>
<td>Model of illness that recognises the contributions that psychological and social factors make to the experience of disease</td>
</tr>
<tr>
<td>Concept</td>
<td>Complex cognitive representations of the experiences that people have, either directly or indirectly through other people or through the media. Concepts may be described by: 1) definition and label, 2) characteristics or attributes, 3) boundaries with related concepts, 4) preconditions, 5) consequences (See Chapter 7 for a detailed description of each of these components)</td>
</tr>
<tr>
<td>Concept analysis</td>
<td>Method of research most often found in nursing literature that seeks to refine or develop understanding of the complex behaviours or phenomena encountered by clinicians or healthcare workers (See Chapter 7)</td>
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<th>Term</th>
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<tr>
<td>Concept maturity</td>
<td>How well each component of a concept has been developed within the literature and how consistently that concept is used in the literature (See Chapter 7)</td>
</tr>
<tr>
<td>Context-specific anxiety</td>
<td>Any form of anxiety in which the source of anxiety is related to a specific object, event or situation (See Chapter 3)</td>
</tr>
<tr>
<td>Disability</td>
<td>A multidimensional concept that includes inability to complete functional tasks or participate in life roles within a given environment (World Health Organization, 2002) (See Chapter 2)</td>
</tr>
<tr>
<td>Distal radius fracture</td>
<td>Wrist fracture (fracture to the end of the radius bone in the forearm closest to the wrist joint)</td>
</tr>
<tr>
<td>Distress</td>
<td>Biological or emotional response to a demand or stressor that is harmful to the individual (Ridner, 2004) (May be used synonymously with psychological distress in this thesis)</td>
</tr>
<tr>
<td>Fracture</td>
<td>Synonymous with break (when referring to bone fractures)</td>
</tr>
<tr>
<td>Generalised Anxiety Disorder (GAD)</td>
<td>Anxiety disorder described in the DSM-IV characterised by excessive anxiety and worry about multiple and varied situations or sources (American Psychiatric Association, 2013)</td>
</tr>
<tr>
<td>Hand therapy/hand therapist</td>
<td>Specialised form of physiotherapy/occupational therapy that focuses on treatment of traumatic and non-traumatic upper limb conditions</td>
</tr>
<tr>
<td>Idiopathic</td>
<td>Unable to be explained by diagnostic testing (e.g. idiopathic pain)</td>
</tr>
<tr>
<td>Impairment</td>
<td>Problems in body function or structure such as a significant deviation or loss (World Health Organization, 2002)</td>
</tr>
<tr>
<td>Injury-related distress</td>
<td>Composite variable described by Victorson, et al. (2008) made up of post-traumatic stress, depression, anxiety and pain and is specifically related to injury (See Chapter 10)</td>
</tr>
<tr>
<td>Ligament</td>
<td>Connects a bone to a bone</td>
</tr>
<tr>
<td>Mild upper limb injury</td>
<td>Used within this thesis as a relative term when comparing samples between the studies in this thesis and those in related research [based loosely upon the Hand Injury Severity Scale (HISS) and the modified HISS] (See Chapter 5 for a more complete discussion)</td>
</tr>
<tr>
<td>Mixed methods</td>
<td>A research design which includes studies that utilise both quantitative and qualitative methods of inquiry</td>
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<td>Term</td>
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<tr>
<td>Pain anxiety</td>
<td>Worry or fear related directly to the experience of pain. Symptoms may be divided into four categories including: 1) cognitive anxiety, 2) escape avoidance behaviours, 3) fear of pain, and 4) physiological symptoms (See Chapter 2)</td>
</tr>
<tr>
<td>Participation restriction</td>
<td>Problems an individual might experience in being involved in life roles or situations (World Health Organization, 2002))</td>
</tr>
<tr>
<td>Post-traumatic stress disorder (PTSD)</td>
<td>Anxiety disorder described by the DSM IV characterised by intrusion symptoms, avoidance symptoms, negative cognitions and mood, and arousal symptoms. Symptoms arise following exposure to significant event and cause distress and disruption in ability to socialise, work or function independently and last more than one month. (See Chapter 2)</td>
</tr>
<tr>
<td>Post-injury anxiety</td>
<td>Anxiety, worry or bother related to an aspect of recovering from a traumatic upper limb injury that has previously been identified as having the potential to cause distress (See Chapter 5).</td>
</tr>
<tr>
<td>Pragmatism</td>
<td>An approach to research which places primary importance on the research question instead of the method or philosophical worldview underlying the methods</td>
</tr>
<tr>
<td>Psychological distress</td>
<td>As defined in Study II = a troubling psychological state precipitated by a traumatic upper limb injury that consists of measurable symptoms of psychological disorders, presents along a continuum of severity from mild to severe, and has negative consequences for mental health and recovery from injury (See Chapter 8).</td>
</tr>
<tr>
<td>Psychosocial</td>
<td>Factors relating to psychological aspects of recovery (e.g. depression or anxiety) or social aspects of recovery (e.g. financial impact, social relationship, work-related issues)</td>
</tr>
<tr>
<td>Recovery-related anxiety</td>
<td>Anxiety at the lower end of the severity continuum that is related directly to some aspect of the experience of recovering from a traumatic injury (i.e. pain anxiety, state anxiety, or anxiety measured by the RRAQ) and not otherwise described in the DSM (See Chapter 5)</td>
</tr>
<tr>
<td>Recovery-Related Anxiety Questionnaire</td>
<td>A tool developed in part for Study I based upon aspects of the experience of recovering from a traumatic upper limb injury that have been identified in previous research as potential stressors. This specific form of context-specific anxiety is referred to in the text as post-injury anxiety (See Chapter 5)</td>
</tr>
<tr>
<td>Severe upper limb injury</td>
<td>Used within this thesis as a relative term when comparing samples between the studies in this thesis and those in related research [based loosely upon the Hand Injury Severity Scale (HISS) and the modified HISS] (See Chapter 5 for a more complete discussion)</td>
</tr>
<tr>
<td>Sprain</td>
<td>Disruption (i.e. tear) of a ligament within a joint (may result in instability of the joint depending on function of the particular ligament)</td>
</tr>
<tr>
<td><strong>State anxiety (S-anxiety)</strong></td>
<td>The transitory experience of anxiety, including both physiological arousal and feelings of tension, apprehension and dread, that occurs in response to a particular situation or event (See Chapter 2)</td>
</tr>
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<tr>
<td><strong>Tendon</strong></td>
<td>Connects a muscle to a bone</td>
</tr>
<tr>
<td><strong>Trait anxiety (T-anxiety):</strong></td>
<td>Relatively stable individual differences indicative of how likely it is that one will perceive a situation as dangerous or threatening (also referred to as neuroticism) (See Chapter 2)</td>
</tr>
<tr>
<td><strong>Traumatic upper limb injury</strong></td>
<td>Any traumatic injury that occurs to the fingers, hand, wrist, forearm, elbow or upper arm (excluding shoulder injuries)</td>
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<tr>
<td>ACC</td>
<td>Accident Compensation Corporation</td>
</tr>
<tr>
<td>AMED</td>
<td>Allied and Complementary Medicine Database</td>
</tr>
<tr>
<td>ASD</td>
<td>Acute stress disorder</td>
</tr>
<tr>
<td>BPS</td>
<td>Biopsychosocial</td>
</tr>
<tr>
<td>CINAHL</td>
<td>Cumulative Index to Nursing and Allied Health Literature</td>
</tr>
<tr>
<td>CRPS</td>
<td>Chronic regional pain syndrome</td>
</tr>
<tr>
<td>DASH</td>
<td>Disabilities of the Arm, Shoulder and Hand Questionnaire</td>
</tr>
<tr>
<td>DSM-IV</td>
<td>The American Psychiatric Association’s Diagnostic and Statistical Manual of Mental Disorders (version IV)</td>
</tr>
<tr>
<td>DSM-5</td>
<td>The American Psychiatric Association’s Diagnostic and Statistical Manual of Mental Disorders (version 5)</td>
</tr>
<tr>
<td>EMBASE</td>
<td>Excerpta Medica database</td>
</tr>
<tr>
<td>GAD</td>
<td>Generalised anxiety disorder</td>
</tr>
<tr>
<td>GHQ</td>
<td>General Health Questionnaire</td>
</tr>
<tr>
<td>HADS</td>
<td>Hospital Anxiety and Depression Scale</td>
</tr>
<tr>
<td>HISS</td>
<td>Hand Injury Severity Score</td>
</tr>
<tr>
<td>ICF</td>
<td>International Classification of Functioning, Disability, and Health</td>
</tr>
<tr>
<td>IES</td>
<td>Impact of Event Scale</td>
</tr>
<tr>
<td>IPQ</td>
<td>Illness Perceptions Questionnaire</td>
</tr>
<tr>
<td>IPQ-R</td>
<td>Illness Perceptions Questionnaire – revised version</td>
</tr>
<tr>
<td>M-HISS</td>
<td>Modified Hand Injury Severity Score</td>
</tr>
<tr>
<td>NZ</td>
<td>New Zealand</td>
</tr>
<tr>
<td>PASS-20</td>
<td>shortened version of the Pain Anxiety Symptoms Scale</td>
</tr>
<tr>
<td>PCS</td>
<td>Pain Catastrophizing Scale</td>
</tr>
<tr>
<td>PRISMA</td>
<td>Preferred Reporting Items for Systematic Reviews and Meta-Analyses</td>
</tr>
<tr>
<td>PTSD</td>
<td>Post-traumatic stress disorder</td>
</tr>
<tr>
<td>QuickDASH</td>
<td>Shortened version of the Disabilities of the Arm, Shoulder and Hand Questionnaire</td>
</tr>
<tr>
<td>RRAQ</td>
<td>Recovery-related Anxiety Questionnaire</td>
</tr>
<tr>
<td>S-Anxiety</td>
<td>State anxiety</td>
</tr>
<tr>
<td>STAI-Y</td>
<td>State and Trait Anxiety Inventory (version Y)</td>
</tr>
<tr>
<td>T-Anxiety</td>
<td>Trait anxiety</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organisation</td>
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Chapter 1

Introduction

1.1 Preamble

Traumatic upper limb injuries are one of the most common injuries seen in outpatient physiotherapy clinics. These injuries may range in severity from mild finger sprains requiring relatively short periods of rehabilitation to severe, mutilating injuries involving damage to multiple structures and requiring extensive rehabilitation. Due to the importance of hands in everyday tasks, however, upper limb injuries of any severity may cause psychological, physical and economic hardship for those who sustain them (Smith, Auchincloss, & Ali, 1985). Because upper limb injuries may result in surgical interventions, extensive rehabilitation, and extended time off of work, they can also create a financial burden on the healthcare system. According to the Accident Compensation Corporation of New Zealand¹ (the national funding service for healthcare-related costs from accidental injury), there were approximately 396,155 active claims relating to traumatic upper limb injuries ranging in severity from mild to severe in New Zealand between July of 2013 and June of 2014. These claims led to a total cost of NZ$284,478,238 (Accident Compensation Corporation, 2014). The high cost of upper limb injuries and recovery both to individuals and to society indicates a need to reduce these financial and personal costs. One way to do this is to identify

¹ The Accident Compensation Corporation (ACC) provides comprehensive no-fault injury coverage for all residents and visitors to New Zealand. This scheme covers payment for treatment (including rehabilitation), help around the house, and partial assistance with income if unable to work during recovery. ACC may also provide assistance with return to work, including retraining if an injured worker is unable to return to a previous job. ACC is funded through levies on New Zealand residents' earnings, businesses' payrolls, petrol and fees from vehicle licensing, and Government funding. (Source: http://www.acc.co.nz/about-acc/overview-of-acc/how-were-funded/index.htm)
aspects of the recovery process that may contribute to extending the recovery time, and thus time off work, or increasing the degree of disability individuals experience following traumatic upper limb injuries.

1.2 The research problem
One of the factors that may influence recovery from mild to moderate traumatic upper limb injuries is the psychological distress caused by the injury. However, research relating to psychological reactions to traumatic upper limb injuries has focused on those with the most severe injuries and has been characterised by symptoms of pathological psychiatric disorders like Post-traumatic Stress Disorder and Generalised Anxiety Disorder. These symptoms may not be relevant in those with milder injuries. Nevertheless, it is possible that those with milder injuries do experience psychological distress relating to their injuries and that this distress may negatively influence their recovery.

1.3 Aim and objectives
The overall aim of this research is to explore anxiety- or distress-based psychological reactions to mild/moderate traumatic upper limb injuries. The five overarching objectives of the research are to:

1) Evaluate the prevalence of anxiety following mild to moderate traumatic upper limb injuries.

2) Determine the relationship between non-pathological anxiety and disability following mild to moderate traumatic upper limb injuries.

3) Investigate how the term psychological distress is used within the literature related to traumatic upper limb injuries.

4) Examine the utility and limitations of psychological distress when conceptualised as an independent concept based on the traumatic upper limb injury literature.

5) Explore the aspects of the experience of recovering from a mild to moderate traumatic upper limb injury that individuals describe as sources of distress.
The three individual studies (Chapters 5, 8 and 9) provide more detailed aims and objectives.

1.4 Structure of thesis

This thesis describes work that can be categorised into two phases. During Phase 1 (Chapters 3-5), I focused on the concept of anxiety following traumatic upper limb injuries. Phase 1 includes a review of the literature pertaining to injury-related anxiety (Chapter 3), an introduction to Study I (Chapter 4) and Study I itself (Chapter 5). Based upon the results of Study I and my increasing awareness of the incongruity between anxiety and my concept of interest, my focus in Phase 2 (Chapters 7-9) shifts from anxiety to psychological distress. Phase 2 includes two studies that explore the concept of psychological distress: Study II (Chapter 8: Psychological distress after hand injury: An evolutionary concept analysis) and Study III (Chapter 9: Sources of distress following minor to moderate traumatic upper limb injury) as well as a chapter describing the methods of concept analysis (Chapter 7). The integrated results of this thesis as a whole are presented in Chapter 10. Taken together, this thesis provides an in-depth exploration of non-pathological psychological reactions to traumatic upper limb injuries.

1.5 Research pathway

In Chapter 2, I cover the theoretical and practical background relating to this thesis as a whole. The first portion of Chapter 2 describes the etiology of and recovery process from traumatic upper limb injuries and discusses the concept of disability. I then provide an overview of the theoretical and methodological perspectives of this research. I explain that I chose a mixed methods design based upon my pragmatic approach to research and I describe the form of mixed methods design that I employed. This design allowed me to offer a comprehensive understanding of the concept of psychological distress following traumatic upper limb injuries. Finally, I explain how the biopsychosocial model of health anchors the theoretical framework of the thesis.
Phase 1

Chapter 3 is a review of the literature and concepts related to Phase 1 of this thesis. In particular, I review the forms of anxiety most relevant to this thesis and describe how anxiety has been presented in the traumatic upper limb literature. Chapter 4 provides an introduction to Study I, including a rationale for the types of anxiety measured within the study and a detailed description of the psychometric properties of the tools used to measure these forms of anxiety and disability within Study I. Chapter 5, which is presented as a published article, includes the full design and results of Study I. The full citation for this article is:


The paper is presented stylistically within the thesis guidelines of the University of Otago and the e-pub version (doi:10.3109/09638288.2014.976719) is included in Appendix C. This article represents work that has been primarily completed by me. I was responsible for the design of the study, obtaining ethical approval for the study, completing the data collection, analyzing the results, and completing the written draft of the final article. Jean Hay-Smith and Gareth Treharne are listed as co-authors for this article. Their contributions include providing supervisory guidance for each step of this process and editing drafts of the written article for clarity and content.

Chapter 6 contains a detailed explanation of the shift in focus from anxiety to psychological distress between Phase 1 and Phase 2 and explains how this shift informs the direction of Phase 2 (including Studies II and III) in this thesis.

Phase 2

Chapter 7 provides background information relating to the practice of concept analysis and serves as a framework for reporting the results of Study II in Chapter 8. I define concepts and concept analysis and describe the most common types of concept analyses. I also provide a rationale for my choice of the Evolutionary
method as the basis of Study II. Chapter 8 presents the design and results of Study II (Psychological distress after hand injury: An evolutionary concept analysis), which examines how psychological distress has been presented within the traumatic upper limb injury literature and provides a picture of psychological distress in this context as an independent concept. Chapter 9 contains the results of Study III (Sources of distress following minor to moderate traumatic upper limb injury), a qualitative exploration of sources of psychological distress from the perspective of individuals who have recently sustained upper limb injuries. Finally, Chapter 10 integrates the findings of all three studies and provides recommendations for future research and clinical implications.
Chapter 2

Theoretical Underpinnings of the Thesis

2.1 Chapter overview

In this chapter, I describe the theoretical and practical background of this thesis. First, I cover the etiology and course of recovery from a hand injury, how the severity of hand injuries is measured, and how disability is defined. This information grounds the research within its clinical roots. Second, I describe the theoretical underpinnings of the research. I explain how disability and hand injuries relate to models of illness and how the Biopsychosocial (BPS) model of health and disease anchors the theoretical framework of this thesis. I also describe methodological considerations that illuminate my position as a researcher and hand therapist, the pragmatic approach I took to the generation of knowledge in this thesis, and how these considerations combined in my choice of a mixed methods design.

2.2 What is a hand injury?

The definition of the term injury has been debated both from theoretical and operational standpoints (Langley & Brennar, 2004). The most concise definitions have been developed within the sports medicine literature; for instance, the International Rugby Board developed a Rugby Injury Consensus Group (RICG) in order to reach a consensus on defining and reporting injuries within rugby-related literature (Fuller, et al., 2007). According to the RICG, an injury is “any physical complaint, which was caused by a transfer of energy that exceeded the body’s ability to maintain its structural and/or functional integrity” (Fuller, et al., 2007). In this thesis, traumatic upper limb injuries refers to any traumatic injury that occurs to the fingers, hand, wrist, forearm, elbow or upper arm (exclusive of the shoulder). Upper limb injuries are one of the most common types of injuries, accounting for between 19% and 29% of all injuries seen by accident and emergency centers in countries as diverse as Denmark (Angermann & Lohmann,
Within New Zealand, there were 1,874,743 active upper limb claims (elbow, finger/thumb, hand/wrist, upper and lower arm) to the Accident Compensation Corporation (ACC) between July 2009 and June 2014 (Accident Compensation Corporation, 2014). According to the ACC website's Injury Statistics Tool, this accounts for 18.7% (total = 10,012,528) of all active claims within this timeframe (Accident Compensation Corporation, 2014). Upper limb injuries are more common in men than women, possibly because many upper limb injuries occur in manual jobs, which are typically dominated by men (Angermann & Lohmann, 1993; Hill, et al., 1998; Van Onselen, Karim, Hage, & Ritt, 2003). The most common reported causes of injuries are falls, sports injuries, and work-related or machinery-related injuries (Angermann & Lohmann, 1993; Hill, et al., 1998). Interestingly, traumatic upper limb injuries involve the dominant and non-dominant hands equally (Angermann & Lohmann, 1993).

One of the difficulties presented by injuries to the upper limb is the interrelationship between the various anatomical structures in the upper limb. The upper limb is made up of a set of systems that function collectively to allow us to feel and manipulate the world around us. These systems include the integumentary system (the skin), skeletal system (the bones, ligaments and tendons), peripheral nervous system (includes nerves that supply sensation to the upper limb and nerves that control the upper limb muscles), the circulatory system (includes veins, arteries, and capillaries that supply blood to the upper limb), the lymphatic system (assists in controlling oedema), and the muscular system (includes the muscles of the upper limb)(Bowers & Tribuzi, 1992). Because each of these systems functions within a tightly enclosed space in the upper limb, damage to one structure can easily create dysfunction in another (Bowers & Tribuzi, 1992). Therefore, what may be described only as a bone fracture may actually include damage to the soft tissues surrounding that bone (i.e. joint capsules, ligaments, tendons) as well as to the vascular and lymphatic vessels in the area of injury (Watson, Moed, Karges, & Cramer, 2000). This secondary damage may result in longer healing times and a longer rehabilitation period. The multisystem impact of many upper limb injuries may create confusion for patients regarding differences
between expected and actual recovery times if they do not have a good understanding of the complex anatomy of the upper limb and how the systems interact.

The severity of an injury to the upper limb varies depending on the location of injury and the number and type of structures damaged (Campbell & Kay, 1996). Severity may be classified using a number of different tools. The most common of these is the Hand Injury Severity Scale (HISS) (Campbell & Kay, 1996). Points on the HISS are assigned based on damage to four broad categories: integument (skin), motor, neural and skeletal systems. Scores are weighted by the relative functional importance of the location of the injury; for instance, a score for an injury to the thumb would be multiplied by six while an injury to the index finger would be multiplied by two, reflecting the functional importance of the thumb. Additional points are assigned to the final score for contaminated wounds, open fractures, and amputations. The final scores may then be classified as ‘minor’ (≤20 points), ‘moderate’ (21-50 points), ‘severe’ (51-100 points) or ‘major’ (≥ 101 points) (Campbell & Kay, 1996). Unfortunately, partly because it is only applicable to hand and finger injuries and does not include more proximal regions of the upper limb such as the wrist and forearm, this system has been largely relegated to research rather than clinical evaluation (Urso-Baiarda, et al., 2008). In response, Urso-Baiarda, et al. (2008) developed the Modified Hand Injury Severity Score (M-HISS), which includes injuries to a greater proportion of the upper limb including the forearm, wrist, hand and fingers. Based upon the HISS, the M-HISS uses a similar rating scale to rank injuries based upon location of injury and structures damaged.

Although the M-HISS addresses the limitation in injury location imposed by the HISS, many authors in this field continue to estimate injury severity based upon surgical status or hospitalization without use of a specific scale (Bear-Lehman & Poole, 2011; Cheung, Alvaro, & Colotla, 2003; Grunert, Devine, Matloub, Sanger, & Yousif, 1988a, 1988b; Gustafsson & Ahlstrom, 2004, 2006; Gustafsson, Persson, & Amilon, 2000; Jaquet, et al., 2002; Jaquet, et al., 2005; Keogh, Book, Thomas, Giddins, & Eccleston, 2009; Ring, et al., 2006; Williams, et al., 2009), perhaps due to the burden of data collection required for a trained clinical assessor to calculate an
accurate M-HISS score. Using this approach, injuries associated with ‘hospitalisation’ or ‘surgery’ are typically described as more severe while those associated with no hospitalization or surgery described as ‘milder.’ There are some limitations to this approach. For instance, it is possible that an individual may sustain what would be rated as a minor injury on the HISS/M-HISS but still be hospitalized for an extended period due to unrelated health issues (such as diabetes) that complicate healing times. In other cases (such as with sprains), different surgeons may choose different treatment options, some of which may be surgical and some non-surgical. These issues make it difficult to accurately classify the severity of injuries based exclusively upon whether or not the injury required hospitalization or surgical repair.

The severity of traumatic upper limb injuries seen in a specialist hand therapy clinic ranges from minor (such as an isolated ligament sprain) to major (such as a complex crush injury involving multiple structures within several anatomical systems) based upon HISS criteria. The course of treatment following an upper limb injury varies greatly depending on severity of injury and the specific structures damaged. If the injury is major or severe, surgery may be required to restore the integrity of bones or soft tissues or to amputate unreparable segments of the limb. Regardless of whether or not surgery is involved, many upper limb injuries are referred to hand therapy for wound and scar management, restoration of motion and strength, oedema management, and functional retraining (Muenzen, et al., 2002).

In general, rehabilitative treatment is guided by three clinically defined phases of healing (Smith, 1992). The first phase is the inflammatory phase, which is a vascular and cellular response to the damaged tissue lasting 2-5 days and serving to clear the wound of debris and prepare it for healing. During this phase, therapy is focused on preventing oedema (swelling) and maintaining motion in uninvolved joints. Overly aggressive therapy during this phase can prolong the inflammatory response (Smith, 1992). During the second phase, the fibroplastic phase, collagen synthesis and fibroblastic proliferation serve to close the wound (whether that wound involves the skin, a tendon, bone, etc) and typically lasts between 2 and 6 weeks. Unless contraindicated (e.g. in the case of an unstable fracture), gentle
protected motion of involved joints and use of the injured limb during light functional tasks begins at this time, although the specific timing for this varies depending on the structure that has been damaged, the related soft tissue damage, and the strength of any repairs (Smith, 1992). The third phase, maturation or remodeling, typically begins at about 6-8 weeks post-injury and includes the reorganization of collagen fibres and increasing strength of the healing structure (Smith, 1992). At this point, the wound is usually able to withstand some resistance and therapy is focused on strengthening the limb, incorporating the limb in everyday and work tasks, and remodeling the scar tissue (e.g. helping to restore motion to stiff joints and remediating any tightness in the skin or soft tissues). The timeframes for each of these phases vary by individual depending on a variety of factors; some of these factors may include the type and number of structures damaged, the severity of injury, the individual’s general health, complications such as wound infections, and overly aggressive therapy or activity (Smith, 1992).

### 2.3 What is disability?

Because hands play such a primary role in so many aspects of life, traumatic upper limb injuries of any severity may cause significant disruptions to physical, psychological, and financial functioning in those who sustain them (Chan, et al., 2009; Gustafsson & Ahlstrom, 2006; Haese, 1985; Hannah, 2011). For instance, cast or splint immobilisation or joint stiffness may make tasks such as getting dressed or preparing food difficult if not impossible to complete independently (Bialocerkowski, 2002; Gustafsson & Ahlstrom, 2004). People are often required to attend multiple visits to their physician, surgeon, or hand therapist following an upper limb injury; the time required to attend these appointments can lead to extended time off work and inability to participate in childcare or valued leisure activities (Schier & Chan, 2007). Taken together, the disruptions to physical abilities and daily routines constitute a form of disability. However, there is some debate regarding the nature of disability.

Health and disability may be defined within three broad models of health and/or disability: the biomedical (or medical) model, the social model, and the biopsychosocial model. The literature related to upper limb injuries most often
measures and describes disability within the biomedical model of health and disability. The biomedical model postulates that all diseases and all symptoms of disease (or injury) arise from an underlying physical abnormality within the body (Engel, 1977). Psychological, environmental, and social influences on disease are not considered within this model outside of the physiological influences they exert on the body. Health, within the biomedical model, is simply defined as the absence of disease with no consideration to the variations in experience or presentation of disease between individuals (Wade, 2004). The biomedical model of illness developed in western Europe approximately 500 years ago through the concurrent emergence of fractional-analytic science and the Christian Church’s insistence that physicians treat only the body and not the mind (Engel, 1977). Although it receives much criticism for its reductionistic view of health, the biomedical model has dominated medicine for most of the past century due to its utility in diagnosing disease and injury.

In keeping the definition of health as an absence of disease, the biomedical (or medical) model views disability as something that occurs within a person that is caused directly by disease or injury (Engel, 1977). Addressing disability within the medical model, therefore, calls for treatment or intervention to correct the problem within that individual. At a basic level, the biomedical model focuses on impairments, defined by the World Health Organization as problems in body function or structure; these problems may be physical (i.e. loss of motion), emotional (i.e. anxiety), cognitive (i.e. memory loss) or developmental (i.e. developmental delay) (World Health Organization, 2002). Outside of medical research, the medical model has been used to define disability for statistical purposes in New Zealand (Statistics New Zealand, 2007). For instance, in its 2006 survey of New Zealand households, Statistics New Zealand defined disability as “any self-perceived limitation in activity resulting from a long-term health problem, lasting longer or expected to last longer than six months or more and not eliminated by an assistive device” (Statistics New Zealand, 2007). In congruence with the medical model, the definition indicates the source of limitations as being within the individual. The medical model of disability is strongly criticized by disability rights advocates, who argue that it results in individuals being defined by
their impairments or medical conditions (i.e. “a spinal cord patient”) (Shakespeare & Watson, 2001). However, this model is useful when exploring the disruption to daily activities and physical capabilities experienced by those who are recovering from mild to moderate upper limb injuries.

The social model of health and disability, in contrast, views disability as a social situation in which individuals with impairments are excluded from full participation in society (World Health Organization, 2002; Barnes & Mercer, 2010). Within this model, the problem lies not with the individual, but with an inaccessible physical, social and cognitive environment created by the attitudes of policy makers, building owners, and others within the social environment. This view of disability was initially espoused in academic circles by activist and researcher Vic Finkelstein, who pointed out the prevailing views of disability (described by the medical model of disability) resulted in the oppression of those who lived with impairments (Finkelstein, 1988). The social disability model is often found in public policy and disability rights documents. For example, the social model of disability was key to the disability movement in that it facilitated a shift in the view of disability within the political establishment to see individuals with impairments as a minority group that could be discriminated against (Shakespeare & Watson, 2001). The social view of disability may be reflected to some extent in the focus on adaptive equipment and modifications to work environments and equipment encouraged by hand therapists in the course of treatment of traumatic injuries.

The third model of disability, the biopsychosocial (BPS) model of health and disease, was proposed by Engel in 1977 as a response to the reductionistic viewpoint of the biomedical model. In contrast to the biomedical model, the BPS model recognises the contributions that psychological and social factors make to the experience and presentation of disease (Engel, 1977). For instance, instead of assuming a direct relationship between tissue damage and pain, the BPS model addresses the role that emotional factors (like depression and anxiety) and social constructs (like community support) have in the experience of pain (Borrell-Carrio, Suchman, & Epstein, 2004; Engel, 1977). Research undertaken using the BPS model has found that both psychological and social factors may have a strong
influence on a wide range of health issues (Christakis & Fowler, 2007; Jaremka, Fagundes, Glaser, et al., 2013). Some research has focused on effect that social and behavioural factors have on disease expression. For instance, researchers at Harvard Medical School found that social networks appeared to influence a person's chances of becoming obese (Christakis & Fowler, 2007) while research by the Diabetes Prevention Program Research Group indicates that health behaviours, such as sedentary lifestyle or poor dietary choices, may also affect the expression of diseases like diabetes (Diabetes Prevention Program Research Group, 2002).

Other research has focused on the influence of psychological factors, such as stress, on suppression of the immune system, potentially leading to increased disease potential (Jaremka, Fagundes, Glaser, et al., 2013; Jaremka, Fagundes, Peng, et al., 2013; Jaremka, Glaser, Loving, et al., 2013; Jaremka, Glaser, Malarkey, & Kiecolt-Glaser, 2013; Jaremka, Lindgren, & Kiecolt-Glaser, 2013) and longer healing times for injury (Kiecolt-Glaser, Marucha, Malarkey, Mercado, & Glaser, 1995). In relation to traumatic injury, the BPS model has been used to study factors related to recovery. For instance, psychological factors such as depression may inhibit recovery from hip fracture while social factors such as community involvement facilitate recovery (Houldin & Hogan-Quigley, 1995). Such findings provide strong evidence that the BPS model provides a useful framework for studying health and disease in a wide variety of settings.

The growing recognition of the biopsychosocial model within recent health research has meant that the influence of psychological and social factors on many aspects of care following upper limb injuries are now well-documented (Galanakos, Bot, Zoubos, & Soucacos, 2014; Vranceanu, Barsky, & Ring, 2009). The *Journal of Hand Therapy* recently published a special issue containing articles related to the psychosocial aspects of upper limb injuries and implications for treatment (April, 2011). There is also evidence that psychological conditions such as depression may have an influence on outcomes measures, such as grip strength, that were previously viewed as exclusively biological in nature (Watson & Ring, 2008). Specifically, depression was association with diminished grip strength in this study (Watson & Ring, 2008). However, these associations must be interpreted with caution when assessing the influence of psychosocial factors on
outcomes such as disability due to limitations in the study design (i.e. retrospective design and a convenience sample, both of which provide weaker evidence than a prospective study with random sampling might provide).

Proponents of the BPS model argue that the development of multidisciplinary upper limb teams practicing within the BPS model have the potential to provide tremendous benefit to patients in addition to those realized through standard, single clinician treatment (Vranceanu & Ring, 2008). Benefits may include improving surgical outcomes, correcting misconceptions about pain, reducing unnecessary tests and surgical procedures, and limiting the number of patients who transition from acute to chronic pain conditions (Vranceanu & Ring, 2008).

The growing acceptance of the BPS model in health-related literature and the potential clinical benefits of approaching the treatment of upper limb injuries within this model confirmed for me that the BPS model was an appropriate framework for exploring psychological reactions to traumatic upper limb injuries.

Modern operational definitions of disability are also often reflective of the biopsychosocial model of health and disability. For instance, within the 2002 International Classification of Functioning, Disability, and Health (ICF) Framework, disability is defined as a complex interaction between an individual and the environment in which he/she lives (World Health Organization, 2002). In contrast to defining disability exclusively as a collection of physical impairments like the medical model of disability, the WHO definition portrays disability as a multidimensional concept in which dysfunction may occur at multiple levels within a given environment (World Health Organization, 2002). These levels include: 1) impairments (problems in body function or structure), 2) activity limitations (difficulties with the execution of a task or action), and 3) participation restrictions (problems with involvement in a life situation) (World Health Organization, 2002). One of the advantages of this model over the medicalised view of disability is that it acknowledges that all individuals can experience decreased functioning due to health at some point in their lives and, therefore, may experience disability. Thus, disability is recognized as a universal human experience (World Health Organization, 2002). In contrast, the biopsychosocial model has received some
criticism for being difficult to apply consistently to individual patients, resulting in an unscientific model (Smith, et al., 2013).

The WHO definition of disability within the ICF framework is the model of disability underpinning this thesis. In particular, in Study I of this thesis (Chapter 5), disability was measured by the shortened version of the Disabilities of the Arm, Shoulder and Hand (QuickDASH) (Beaton, Wright, & Katz, 2005), which was specifically designed to mirror the three realms of disability defined by the ICF: impairments, activity limitations, and participation restrictions (Dixon, Johnston, McQueen, & Court-Brown, 2008). In addition, the emphasis on disability as an interaction between individual factors and the environment in which that individual operates reflects one of the major concepts developed within this thesis: the importance of context in the development of psychological distress (see Chapter 5).

My professional experience has also influenced my choice of illness model. As a practicing hand therapist, I have worked within the areas of orthopaedics and burns for more than 15 years. Hand injuries are often complex, involving multiple structures and body systems, and may take months or even years of intensive therapy and surgery to achieve maximum function. As a new therapist, the complexity of these injuries and the biomedical culture within the treatment teams attending to these patients led me to approach hand injuries largely as a physical issue. However, increased experience working with individuals with upper limb injuries has suggested to me that the emotional, social, and cognitive aspects of these injuries may have a tremendous impact on the experience of recovery. The BPS model aligns with this experience and is therefore an appropriate framework to apply to my research.

Although the BPS model serves as the operational framework for my thesis in general, there is one other theoretical perspectives that is particularly relevant. Phase 2 of this thesis relies heavily upon the theory of stress and coping described by Lazarus and Folkman (Lazarus & Folkman, 1984) as a conceptual basis for the particular form of psychological distress that I am interested in studying (see Chapter 6 for a description of this theory).
2.4 Pragmatism as a worldview/paradigm

In addition to a theoretical framework, research requires the acknowledgement of a worldview or paradigm to frame the generation of knowledge. The research presented in this thesis was completed within a pragmatic worldview. Pragmatism is based on the work of Dewey, James and Mead and is essentially a “what works” approach to research design and methodology (Creswell & Plano-Clark, 2007). Pragmatism allows researchers to avoid a forced choice between the positivism of quantitative methods and the constructionism seen in many qualitative studies by allowing that there are singular and multiple realities (Feilzer, 2010). Within pragmatism, the research question takes on the primary importance rather than the design or the philosophical worldview underlying the methods. As such, researchers working within pragmatism are free to choose the design, methods and techniques that best suit their needs and the research is framed in terms of its intended outcomes or what the researchers hope it will achieve (Creswell & Plano-Clark, 2007). Pragmatism is especially well suited to the complexity of issues raised in health psychology and rehabilitation research. Within these disciplines, research questions are often focused on ‘real world’ research contexts which may not be adequately portrayed by quantitative (Dures, Rumsey, Morris, & Gleeson, 2011) or by qualitative (Florczak, 2014) designs alone. ‘Real world’ research aligns with my background as a hand therapist and my wish to undertake research that will have relevance to the interdisciplinary teams who work with patients with upper limb injuries.

2.5 Methodological considerations

Research designs can be broadly described as quantitative, qualitative, or mixed methods. The choice of methodology depends upon the goals of the research and the philosophical stance of the researchers. Quantitative studies may be used to ask questions such as “how many?” and “how much?” in order to measure, predict and correlate items (Dures, et al., 2011). Qualitative studies are undertaken to ask “what” and “how” in order to gain an understanding of underlying issues or themes (Dures, et al., 2011). Mixed methods designs may be used to examine links and explore the relationships between the results of these two types of methods. Some researchers argue that mixed methods serve as a “third paradigm choice” that
provides “the most informative, complete, balanced, and useful research results” (Dures, et al., 2011). As the aim of my research was to develop a robust understanding of “post-injury distress (anxiety),” I wanted to ask questions relating to both “how much distress?” and “what kind of distress?” A mixed methods approach allowed me to ask both of these types of questions within this thesis.

According to Creswell (2007), there are four main study designs for mixed methods studies: 1) triangulation, in which a researcher obtains data on the same topic from different but complementary sources; 2) embedded design, where a second set of data provides support to another primary data source; 3) explanatory design, where the overall purpose of the qualitative data is to explain or build upon the quantitative results; and 4) exploratory sequential design, which usually begins qualitatively and uses the results to conduct a quantitative study (Creswell & Plano-Clark, 2007). Although the design of this thesis is consistent with aspects of both the triangulation and explanatory designs, none of these designs is a good fit for the overall design of the research presented here.

An alternative sequential design is the profoundisation model described by Langdridge & Hagger-Johnson (2009). This model most often begins with a quantitative study followed by a qualitative study intended to explore unusual aspects of the quantitative data or to explain mechanisms or causal relationships revealed in the quantitative results (Langdridge & Hagger-Johnson, 2009). The qualitative portion of this design is intended to service the larger quantitative portion and is often used alongside randomized controlled trials. This ordering of qualitative/quantitative would be described by Creswell (2007) as an explanatory design, but Langdridge & Hagger Johnsonn (2009) argue that the qualitative study may be exploratory in nature rather than explanatory, in which the research is attempting to provide an explanation for variation in data. The profoundisation model fits well with the relationship between Studies I (quantitative: prevalence of anxiety) and II (qualitative: concept analysis) and between studies I and III (qualitative: sources of distress). However, it does not provide an adequate fit as a model for the general design of the overall research in this thesis. In particular, the weighting of the quantitative and qualitative results is intended to be equal in this
thesis and the profoundisation model does not account for the relationship between studies II and III.

In keeping with the pragmatic approach, therefore, this research employs a hybrid of the profoundisation model with equal emphasis on the quantitative and qualitative components. The main aim of this thesis is to explore psychological reactions to traumatic upper limb injuries. In the first study, “Recovery-related anxiety and disability following upper limb injury: The importance of context” (see Chapter 5), I employed a quantitative approach to measure the prevalence of four forms of anxiety following traumatic upper limb injury. The results of this study suggested that anxiety related directly to aspects of the recovery experience (called post-injury anxiety in this thesis) could be indicative of a different concept than the other forms of anxiety measured in Study I (see Chapter 6). Further analysis of the results of Study I suggested that post-injury anxiety was conceptually more aligned with the term psychological distress than anxiety. In order to explore the concept of psychological distress following traumatic upper limb injuries further, therefore, Part II of this thesis contains two qualitative studies designed to: 1) explore how the concept of psychological distress has been presented in the related literature (see Chapter 8), and 2) to develop the concept of psychological distress as an independent concept in a sample of individuals similar to that of Study I (see Study 9).

![Figure 2.1: Schematic of the relationships between the studies in this thesis](image-url)
2.6 Chapter Summary

I have described both the theoretical and clinical perspectives that underpin this thesis. Congruent with a BPS model of health and disease, the three studies in this thesis explore the concepts of anxiety and distress following physical injury. Based on a pragmatic approach to knowledge development, I utilized a mixed methods design to provide a perspective on this anxiety/distress from multiple vantage points. While the study in Phase 1 is focused on the measurement of anxiety following traumatic upper limb injuries (see Chapter 5/Study I: Recovery-related anxiety and disability following upper limb injury: The importance of context), Phase 2 develops the concept of a context-specific psychological distress as an independent concept in this research area (see Chapter 8/Study II: Psychological distress after hand injury: An evolutionary concept analysis and Chapter 9/Study III: Sources of distress following minor to moderate traumatic upper limb injury). Chapter 3 provides the background to Phase 1 of this thesis by reviewing the definitions of anxiety within healthcare literature and providing a overview of how these definitions have been utilised in literature relating to traumatic upper limb injuries.
Chapter 3

Study I Background

3.1 Chapter overview
In this chapter, I cover the background literature related to Study I. I start with a description of the research problem and how this led to a focus on the concept of anxiety within Phase 1. I then review the various ways in which anxiety is presented in research relating to traumatic upper limb injuries. The literature related to the conceptual shift from anxiety to psychological distress that occurs between Phases 1 and 2 is described in Chapters 6 (which describes the conceptual shift from anxiety to psychological distress within this thesis and provides the background and significance for Phase 2) and 8 (which contains Study III, an evolutionary concept analysis of psychological distress).

3.2 What is the research problem?
Modern approaches to medical diagnosis and rehabilitation assume that recovery from traumatic upper limb injuries can be predicted by the physical characteristics of the injury and the overall health of the individual: number and type of structures damaged, complexity of soft tissue involvement, age of the patient, underlying medical conditions. This reflects the biomedical model of illness (as outlined in section 2.4), which is based on the assumption that injury and its subsequent symptoms can be fully understood as a collection of pathophysiological variables. This approach comes with the implication that identification and remediation of these variables will ultimately lead to the elimination of the patient's symptoms. Within the biomedical model, psychological reactions to the injury like anxiety or depression are defined within neurophysiological and biochemical contexts while social variables are not taken into account. However, due to its utility in diagnosing injury, the biomedical model remains the dominant model of illness for those treating upper limb injuries today (Vranceanu & Ring, 2008).
Unfortunately, the biomedical model fails to explain the limited correlation between physiological findings and variability in pain or disability in those with traumatic upper limb injuries (Doornberg, et al., 2005; Karnezis & Fragkiadakis, 2002; Lindenhovius, Buijze, Kloen, & Ring, 2008). For instance, Grewal et al. (2007) found that physical characteristics of wrist fractures, such as fracture displacement, had no significant influence on disability reported at one year post-injury (Grewal, MacDermid, Pope, & Chesworth, 2007). Similarly, MacDermid et al. (2002) noted that physical impairments such as reduced motion and strength account for only a small portion (25%) of the disability reported six months after a wrist fracture (MacDermid, Donner, Richards, & Roth, 2002). These findings are consistent with the limited associations between physical findings and disability or pain found in studies looking at upper limb trauma (Doornberg, et al., 2005; Karnezis & Fragkiadakis, 2002; Lindenhovius, et al., 2008), surgical interventions for arthritis pain in the thumb (Angst, et al., 2005), and lower extremity fractures (Mock, et al., 2000). In fact, little is known about the threat of disability following injuries traditionally considered more minor in general (Gabbe, et al., 2013). As noted by Grewal (2007), conceptual factors outside of the biomedical model must be explored to account for the variation in levels of disability and pain experienced by those with similar types of injuries.

One hypothesis for the disparity between physical findings and disability is that psychosocial factors play a larger role in recovery from traumatic injuries than recognised within a biomedical model of illness. For instance, Ring, et al. (2006) have found an association between depression and health status in those with upper limb conditions. A growing body of research also indicates that anxiety is present in many people following traumatic injuries, and that there is a significant relationship between anxiety and both quality of life and disability following acute injuries (Mason, et al., 2009; O’Donnell, 2005; Ponsford, Hill, Karamitsios, & Bahar-Fuchs, 2008). Specifically, Ponsford et al. (2008) found that clinically significant levels of general anxiety were present in 36% of orthopaedic patients they surveyed at 1 year post-injury, increasing to 39% by 2 years post-injury. O’Donnell et al. (2005) found those with higher levels of acute psychological responses (including anxiety, depression, and PTSD) had higher long-term disability levels.
and a greater severity of experienced disability (O’Donnell, 2005). In relation to upper limb injuries, Grunert, Smith, et al. (1988) have shown that up to 94% of individuals with a severe traumatic hand injury suffer from some form of anxiety in the early stages of recovery. These results have both clinical and research implications. The high levels of anxiety noted in these studies suggests that anxiety following traumatic upper limb injuries needs to be measured and its sources understood. Clinically, they indicate that health professionals need to be aware of the potential for anxiety both in the early days following a musculoskeletal injury and in the later stages of the recovery process, when it would appear that the physical aspects of the injury were healed. Unfortunately, information about emotional reactions to injury is not routinely collected in a typical upper limb rehabilitation practice.

My research explores the concept of psychological distress and the relationship between psychological variables, specifically anxiety and distress, and the relationship between these variables and disability following traumatic upper limb injuries. In Study I, the psychological variable of interest is anxiety while Studies II and III address a different psychological focus, context-based psychological distress (see Chapter 6 for an explanation of this shift in focus).

**3.3 What is anxiety?**

One of the difficulties in the study of anxiety lies in the many ways anxiety is described. In popular and general health literature, the terms anxiety, stress, and fear are often used interchangeably. In addition, anxiety may be grouped with other psychological variables like depression under an umbrella term such as mood disorder. In studies on upper limb injuries, anxiety has alternatively been labelled as a *psychological difficulty* (Cheung, Alvaro, & Colotla, 2003), *psychological problem* (Richards, 2011; Gustafsson, Amilon, & Ahlstrom, 2003), *trauma-related distress* (Gustafsson & Ahlstrom, 2004; Gustafsson, Amilon, & Ahlstrom, 2003), *psychological stress* (Gustafsson, Persson, & Amilon, 2000), *emotional distress* (Gustafsson & Ahlstrom, 2006), and *a psychological factor* (Sonmez, 2010). This makes comparisons between studies looking at anxiety within an upper limb injury population difficult because it is not clear that the
same concept is being examined across studies. The following sections describe the forms of anxiety that are most relevant to this thesis.

3.3.1 Anxiety as a pathological disorder
The most commonly cited reference for anxiety is The American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition – Text Revision* (American Psychiatric Association, 2000). A new edition to this manual, the DSM-5 was published in 2013 (American Psychiatric Association, 2013). I will refer to the definitions of anxiety as described by the DSM-5; however, as most of the research described in this thesis relies on the definitions of anxiety from the DSM-IV, I will note where the DSM-5 definitions differ from those of the DSM-IV. Both the DSM-IV and the DSM-5 define a range of anxiety disorders that share a common presentation of excessive fear, anxiety and behavioural characteristics (American Psychiatric Association, 2013). Within the DSM-5, *fear* is defined as an emotional response to a real or imagined threat while *anxiety* refers to the anticipation of future threat (American Psychiatric Association, 2013). The psychiatric conditions described as anxiety disorders differ from each other in the source of the threat and the criteria for diagnosis. For instance, separation anxiety is focused on a fear of separation from those to whom an individual is attached, while agoraphobia refers to fear about being in enclosed spaces, open spaces, or using public transportation (American Psychiatric Association, 2013). Anxiety disorders differ from normal fear or anxiety in that the duration of symptoms is longer (symptoms in disorders typically last six months or more) and that the response is considered out of proportion to the inciting event (American Psychiatric Association, 2013). Some examples of the anxiety disorders described in the DSM-IV and DSM-5 include separation anxiety disorder, obsessive-compulsive disorder, specific phobias, and panic disorder. The anxiety disorder that is most relevant to this thesis is Generalized Anxiety Disorder (GAD).
3.3.1.1 Generalised Anxiety Disorder (GAD)

GAD is characterised by excessive anxiety and worry about multiple and varied situations or sources. Although worry is not specifically defined by the DSM (IV or 5), worry has been described as feelings of anxiety, tension or apprehension focused on future rather than past or present situations (Borkovec, Robinson, Pruzinsky, & DePree, 1983). The focus of the worry may shift from one concern to another during the course of the disorder but it remains present for most days over a time period of more than six months. An individual with GAD may find it difficult to control the worry and to keep worrisome thoughts from interfering with daily tasks. In addition to the cognitive and emotional aspects, GAD is also characterised by the presence of additional symptoms, including:

1. restlessness
2. fatigue
3. difficulty concentrating
4. irritability
5. muscle tension
6. sleep disturbances

In order to be diagnosed with GAD, the worry and subsequent physical symptoms must cause significant distress to the person and create disruptions in social, work or other important roles or life events. According to the DSM-5, GAD differs from non-pathological anxiety in the following ways: 1) the worry associated with GAD is excessive and interferes with psychosocial functioning while everyday worries are perceived as manageable and may be put aside for more pressing matters; 2) worries associated with GAD are pervasive, pronounced and distressing; 3) everyday worries are less likely to be accompanied by physical symptoms like restlessness (American Psychiatric Association, 2013). GAD may be accompanied by associated symptoms such as trembling, twitching, feeling shaky, muscle aches, sweating, nausea, diarrhoea, an exaggerated startle response, irritable bowel syndrome, or headaches. Symptoms of autonomic hyperarousal, such as accelerated heart rate, shortness of breath, and dizziness, are less frequently seen with GAD, but may be present in other anxiety disorders (such as panic disorder).
The prevalence of GAD within the general population of the United States is 0.9% among adolescents and 2.9% among adults (American Psychiatric Association, 2013). According to the New Zealand Ministry of Health, the 12-month prevalence of GAD among adults in NZ in 2006 was 2% (Wells, 2006).

Research relating to symptoms of GAD following traumatic upper limb injuries indicates that anxiety impacts recovery variably. For instance, GAD symptoms following traumatic upper limb injuries have been correlated with increased pain levels (Jelicic & Kempen, 1999), greater dissatisfaction with social life (Lee, et al., 1985), and less engagement in social activities (Lee, et al., 1985). Anxiety may also impact the ways in which patients cope with their injuries; higher anxiety scores have been associated with an external locus of control (Lee, et al., 1985) and avoidant coping strategies (Desmond, 2007). However, there is some evidence that symptoms of GAD do not necessarily lead to chronic pain conditions such as chronic regional pain syndrome following wrist fractures (Field & Gardner, 1997). Results of these studies suggest that anxiety may have a significant effect on quality of life during recovery from an upper limb injury and on the recovery experience itself.

Unfortunately, symptoms of GAD appear to be a common occurrence after traumatic upper limb injuries. Following traumatic upper limb amputations, nearly 35% of participants demonstrated symptoms of GAD (Desmond, 2007). In a cohort of participants with severe traumatic hand injuries, Grunert, et al. (1992) found that nearly half of participants exhibited symptoms of generalized anxiety in the period immediately following injury. However, the prevalence of GAD within this cohort declined steadily so that only 6% of participants reported anxiety symptoms at 18 months post-injury (Grunert, Devine, et al., 1992). Although overall anxiety levels declined, one anxiety symptom, irritability, remained present in 27% of participants at 18 months post-injury. These results suggest that those with the most severe hand injuries might have a particular need for psychological support in the early days following injury, but that healthcare workers should be alert for isolated symptoms such as irritability for an extended period of time following injury.
Although GAD was evaluated by an interview with a psychologist in Grunert’s (1992) study, most research related to traumatic upper limb injuries makes use of validated self-report questionnaires to measure symptoms of GAD. These measures are typically designed to screen for symptoms of generalised anxiety without actually providing a formal diagnosis. For instance, the General Health Questionnaire (GHQ) is intended to be a screening tool to detect those at risk of developing psychiatric disorders (Jackson, 2007) while the Hospital Anxiety and Depression Scale (HADS) was designed to screen for possible anxiety and depression in those with physical illnesses (Zigmond & Snaith, 1983)[See Chapter 8]. The items on these questionnaires reflect the symptoms of GAD as described by the DSM-IV (American Psychiatric Association, 2000), suggesting that while these tools are not providing a diagnosis of GAD, they appear to be measuring the same construct.

Research into emotional reactions to upper limb injuries utilising self-report measures by Gustafsson and colleagues suggests that symptoms of GAD may be less common following more minor traumatic upper limb injuries (Gustafsson & Ahlstrom, 2004, 2006; Gustafsson, et al., 2003). Anxiety in these studies was separated into “trauma-related distress,” which referred to the symptoms of PTSD, and “mood disorders,” which was taken from scores on the anxiety subscale of the HADS (Zigmond & Snaith, 1983). Participants were classified as “non-cases,” “possible cases,” and “definite cases” of anxiety or depression based upon their scores on each scale. Overall, 10-32% of participants reported some anxiety or depression (Gustafsson & Ahlstrom, 2004, 2006; Gustafsson, et al., 2003). One explanation for this range of prevalence estimates might be the different methods of assessing GAD [interview with psychologist in Grunert’s studies (Grunert, Devine, et al., 1992; Grunert, Smith, et al., 1988) versus self-report measures in Gustafsson et al.’s studies]. The lower prevalence of anxiety Gustafsson et al.’s studies may also be due to the less severe nature of the injuries represented by participants in the studies. However, it is conceivable that either the general nature of the questions on the HADS failed to address the sources of anxiety experienced by patients with less severe injuries or that patients did not relate their anxiety to the symptoms described in the HADS.
3.3.2 Trauma- and Stressor-Related Disorders

Prior to the DSM-5, post-traumatic stress disorder (PTSD) and acute stress disorder were listed as anxiety disorders in the DSM (American Psychiatric Association, 2000). However, in the DSM-5, these disorders were moved to a new category entitled Trauma- and Stressor-Related Disorders (p265-290), which includes disorders in which exposure to a traumatic or stressful event is a criteria for diagnosis (American Psychiatric Association, 2013). The disorders in this category include reactive attachment disorder, disinhibited social engagement disorder, PTSD, acute stress disorder, and adjustment disorders. By placing the trauma and stressor-related disorders immediately after the Anxiety disorders, the authors of the DSM-5 acknowledged the close relationship between these disorders and the anxiety disorders (American Psychiatric Association, 2013). Because they were listed as anxiety disorders until 2013 and because most of the literature referred to in this thesis refers to this classification, these disorders are referred to as anxiety within this thesis. The three diagnoses within this category that are most relevant to traumatic upper limb injuries include post-traumatic stress disorder (PTSD), acute stress disorder, and adjustment disorder.

3.3.2.1 Post-traumatic stress disorder (PTSD)

Individuals may be diagnosed with PTSD following exposure to an incident of actual or threatened death, serious injury or sexual violation that results in clinically significant distress and disruption in ability to socialise, work, or function independently (American Psychiatric Association, 2013). Symptoms of PTSD are divided into four categories and include intrusion symptoms (e.g. distressing memories, nightmares, flashbacks), avoidance symptoms (e.g. behavioural or cognitive avoidance of places, memories or thoughts associated with the event), negative cognitions and mood (e.g. feelings such as blame of self or others, diminished interest in activities, inability to remember key aspects of event) and arousal symptoms (e.g. irritability, sleeplessness, emotional lability, reckless or self-destructive behaviour, hypervigilance). For a diagnosis of PTSD, the symptoms described above must last for more than one month (changed from three months in DSM-IV). The symptoms of PTSD may vary by individual and over time within an individual. Symptoms usually begin within the first three months following the
inciting event, although a long delay before symptoms are noted is possible
(American Psychiatric Association, 2013). In approximately half of adults with
PTSD, complete recovery occurs within three months. According to the DSM-5,
some of the risk factors of developing PTSD include greater severity of trauma,
perceived threat to life, interpersonal violence, and personal injury. The
prevalence of PTSD using DSM-IV criteria (prevalence based on the DSM-5 criteria
are unavailable as yet) is about 3.5% in the US and 0.5-1% in Europe, Asian,

Research relating psychological reactions to traumatic upper limb injuries has
focused heavily on symptoms of post-traumatic stress (Grunert, Devine, Matloub,
Sanger, & Yousif, 1988a; Grunert, Devine, et al., 1992; Grunert, et al., 1989; Grunert,
There has also been a focus on those with severe injuries. For instance, in
interviews with a psychologist, Grunert, Smith, et al. (1988) found that up to 94%
of a sample of 67 patients developed significant psychological symptoms
consistent with PTSD following severe hand injuries at some point early in the
recovery process. The most frequently reported symptoms were nightmares
(92%), flashbacks (88%) and emotional arousal whenever the injury was
discussed (84%). Symptoms tended to decrease quickly, with only 13% of patients
reporting nightmares and 63% continuing to experience flashbacks at two months
post-injury (Grunert, et al., 1988). These results were reinforced by Jaquet, et al.
(2005), who found that 64% of participants (N = 67) demonstrated moderate to
severe levels of PTSD symptoms in the first month following severe wrist injuries
(Jaquet, et al., 2005). While these results may be somewhat alarming for healthcare
providers, the high rates of PTSD symptoms in these studies may reflect the severe
nature of the injuries in the samples.

Although rates of PTSD symptoms have been slightly lower in the majority of other
traumatic upper limb injury research, studies confirm that symptoms of PTSD are
common. For instance, 45-66% of participants experienced medium to high levels
of PTSD symptoms in studies reporting a wider range of severity of traumatic
upper limb injuries (Gustafsson, et al., 2003; Jaquet, et al., 2002; Jaquet, et al., 2005;
Lam, Chan, & Lam, 2011). Nearly a third of patients screened for PTSD after a hand
injury requiring inpatient hospitalisation continued to have symptoms of PTSD one year after injury (Gustafsson & Ahlstrom, 2004). Over 50% of patients with work-related injury may also suffer some degree of PTSD (Hennigar, Saunders, & Efendov, 2001). There is some evidence that those with upper limb injuries may experience more symptoms of PTSD than those with lower limb injuries; Cheung found those with upper limb amputations experienced a greater frequency of PTSD symptoms than those with lower limb amputations (Cheung, et al., 2003). The wide range of scores on the Impact of Event Scale (IES)(a self-report screening tool for symptoms of PTSD) following severe traumatic wrist injuries implies that the expression of symptoms of PTSD varies considerably by individual (Jaquet, et al., 2005), with some individuals reporting a greater number of symptoms than others.

Like symptoms of GAD, PTSD symptoms are associated with variability in outcomes following traumatic upper limb injuries. For instance, the presence of PTSD symptoms following traumatic upper limb injuries have been correlated with increased disability (Bear-Lehman & Poole, 2011), pain, decreased satisfaction with hand function and poor aesthetics (Opsteegh, et al., 2010). Some research has suggested that symptoms of PTSD may be predicted by negative reactions to sight of the hand following traumatic injury (Gustafsson, et al., 2003). Symptoms of PTSD are also correlated with increased time off work (Jaquet, et al., 2002; Opsteegh, et al., 2009), difficulty with functional tasks, and delayed motor recovery (Jaquet, et al., 2002). These correlations persist an average of 16 months following emergency hand surgery, suggesting that symptoms of PTSD impact many aspects of life long after the physical injury has healed (Richards, Garvert, McDade, Carlson, & Curtin, 2011).

Symptoms of PTSD are also associated with psychosocial variables in recovery from injury. For instance, PTSD symptoms have been associated with certain coping styles including self-blame, emotional venting and behavioural disengagement (Victorson, Farmer, Burnett, Ouellette, & Barocas, 2005) and have been significantly linked with depression (Williams, et al., 2009). No correlation was found between social support and symptoms of PTSD following upper limb fractures (Lam, et al., 2011). However, the majority of participants in Lam, et al.
(2010) reported satisfaction with their social support; further exploration of the relationship between PTSD and social support including those who were unhappy with their social situation might produce different results. In sum, symptoms of PTSD are associated with worse outcomes following traumatic upper limb injuries and may be indicative of maladaptive coping styles and associated psychological conditions.

### 3.3.2.2 Acute stress disorder

Acute stress disorder is similar to PTSD with the exception that symptoms resolve after a short period of time (three days to one month). Diagnostic criteria include the development of characteristic symptoms following exposure to a traumatic event or events. The event may be experienced directly or indirectly (for instance, by witnessing a traumatic event). Symptoms of acute stress disorder are divided into five categories, including intrusion, negative mood, dissociation, avoidance and arousal, and mirror the symptoms described for PTSD. One of the features of acute stress disorder is that sufferers may experience an acute negative reaction to their role in the event (i.e. guilt or blame). They may also exhibit erratic or irrational behavior. Acute stress disorder may progress to a diagnosis of PTSD after one month or it may spontaneously resolve. The prevalence of acute stress disorder following industrial accidents in both US and non-US populations is 6-12%, while the prevalence following motor vehicle accidents is 13-21% (American Psychiatric Association, 2013). Acute stress disorder as a specific diagnosis has not been reported in relation to traumatic upper limb injuries, although many of the studies listed in the PTSD section above described symptoms that could be attributed to acute stress disorder that has developed into PTSD.

### 3.3.2.3 Adjustment disorders

Adjustment disorders refer to a heterogeneous array of stress-response syndromes that occur following exposure to an identifiable stressful event or events. These disorders are marked by distress that is out of proportion to the inciting stressor and results in a significant disruption to social, occupational or other area of functioning (American Psychiatric Association, 2013). Symptoms present within three months of onset of stressor and last no longer than six
months after the stressor and its consequences have stopped. According to the DSM-5, adjustment disorders are particularly common within a hospital psychiatric consultation setting, sometimes reaching as high as 50% of patients seen for care (American Psychiatric Association, 2013). Adjustment disorders have been recorded following traumatic upper limb injury as well. For instance, following replantation procedures (in which a severed body part is reattached), 27% of participants with either an upper or lower limb injury demonstrated an adjustment disorder with anxious mood (Schweitzer & Rosenbaum, 1982). In addition, Chaudhury reported symptoms of adjustment disorder in 9% of patients with lower limb fracture (N = 100) and 3% in those with an upper limb fracture (N = 100) (Chaudhury, 2009). With the exception of these two studies, there is scant research describing adjustment disorders following traumatic upper limb injuries.

3.3.3 Recovery-related anxiety

While these diagnostic forms of anxiety provide a common language with which to approach the study of anxiety, limiting the study of anxiety within an acute injury population to diagnosable anxiety disorders may result in an incomplete understanding of anxiety following traumatic injury. First, the extreme nature of the symptoms attributed to the anxiety disorders described above may not be relevant to those with milder traumatic injuries (see Chapter 5 for a review of the literature related to this statement). Second, anxiety disorders are often screened by self-report measures in health-related research. These measures tend to focus on symptoms of anxiety with little reference to the inciting event (namely, the traumatic injury), resulting in a decontextualised view of the emotional reaction individuals may be experiencing (see Chapter 6). In order to address these limitations, a number of forms of anxiety have been described within health-related research that are both non-diagnostic in nature (i.e. they are not included as forms of anxiety in the DSM) and that, in some cases, relate the symptoms of anxiety directly to the traumatic injury. These forms of anxiety include state anxiety, pain anxiety, catastrophising, anxiety sensitivity, and health anxiety. Although there is some overlap between these types of anxiety, each has been found to be psychometrically distinct from related concepts.
### 3.3.3.1 State Anxiety (and Trait Anxiety)

State anxiety is the transitory experience of anxiety, including both physiological arousal and feelings of tension, apprehension and dread, that occurs in response to a particular situation or event (Spielberger, 1972). The suggestion that the general construct of anxiety could be broken down into a stable trait anxiety and a more situational state anxiety was introduced by Cattell et al. and expanded by Spielberger, et al. (Cattell, Shrader, & Barton, 1974; Spielberger, 1983; Spielberger, 1970; Spielberger & Krasner, 1988). In particular, Spielberger defined trait anxiety as relatively stable individual differences indicative of how likely it is that one will perceive a situation as dangerous or threatening (Spielberger, 1972; Spielberger & Krasner, 1988). Trait anxiety has also been referred to as neuroticism or general maladjustment (Watson & Clark, 1984). State and trait anxiety are strongly correlated; the stronger the trait anxiety, the more frequent and intense the experiences of state anxiety may be because the number of situations interpreted as threatening is greater (Spielberger, 1972). Although trait anxiety is similar to the anxiety disorders in that it is considered to occur outside of any particular stressor, state anxiety may be directly linked to an injury experience by asking respondents to consider their symptoms within a particular timeframe (i.e. time since injury).

State anxiety has been linked to both pain and disability following injury. For instance, increased levels of state anxiety have been associated with increased reported pain intensity in a laboratory setting involving induced pain using the cold pressor test (Jones & Zachariae, 2004) or painful electrical stimuli (Tang & Gibson, 2005). Increased state anxiety has also been associated with reduced pain tolerance among student volunteers during a pressure pain task (Carter, et al., 2002). State anxiety may be influenced by behavioural strategies (such as audiotaped relaxation training and EMG-biofeedback-assisted relaxation) aimed at relieving pain following severe orthopaedic trauma (Achterberg, Kenner, & Casey, 1989). However, the information relating to state anxiety following traumatic upper limb injuries can only be extrapolated from these studies as none have focused specifically on pain following traumatic upper limb injuries.
Trait anxiety, or neuroticism, has received more attention in upper limb injury research. Mercan (2005) evaluated the psychological traits of those who sustained Boxer's fractures, a fracture of the metacarpal bone in the hand most often occurring following a punch to something hard. He found that patients with Boxer’s fracture reported higher levels of trait anxiety than controls (Mercan, et al., 2005). Puchalski also evaluated trait anxiety, or neuroticism, in a group of individuals who had sustained wrist fractures, observing that those who went on to develop chronic regional pain syndrome (CRPS) did not necessarily display elevated neuroticism (Puchalski & Zyluk, 2005). Neuroticism was also not associated with disability in a study of those with upper limb diagnoses involving little variability in presentation (e.g. carpal tunnel syndrome or trigger finger) (Ring, et al., 2006). The results of these studies suggest that a stable anxious personality characteristic does not predispose one to the development of chronic pain conditions (such as CRPS) or disability, but may contribute to an understanding of which individuals are more likely to sustain certain types of injuries (like Boxer's fractures).

Despite the lack of correlation between trait anxiety and chronic pain or disability, trait anxiety does appear to influence the experience of pain following upper limb injuries. In particular, trait anxiety has been correlated with increased catastrophising (see Catastrophising, below), lower ability to control and reduce pain (Hallberg & Carlsson, 1998), and increased pain severity (McCracken, Zayfert, & Gross, 1992). In individuals who experience musculoskeletal pain, trait anxiety has also been associated with increased disability levels (McCracken, et al., 1992). As higher reported pain has been shown to lead to poorer perceptions of ability to complete functional tasks (Lindenhovius, et al., 2008; Ponsford, et al., 2008) and poorer satisfaction with outcomes of surgery (O'Toole, et al., 2008), the relationship between trait anxiety and acute pain plays a potentially important role in outcomes following upper limb injuries.

Although the research related to traumatic upper limb injuries has focused on trait anxiety, the interrelationship between trait and state anxiety is an important consideration. In particular, Spielberger notes that the relationship between state and trait anxiety is regulated by whether or not one finds an experience to be
threatening, which he felt was influenced by individual experiences (Spielberger, 1983). This is particularly relevant to injury experiences; for instance, some may find a hospital to be threatening based on prior experiences while others may have no negative associations with this environment. Significantly, with some notable exceptions in the qualitative literature (Gustafsson & Ahlstrom, 2004; Gustafsson, et al., 2000; Haese, 1985), little research to date has embraced the importance of evaluating the specific experiences related to an injury that individuals with upper limb injuries find threatening. This thesis addresses this deficit.

3.3.3.2 Pain anxiety/fear of pain

Pain anxiety has been variably described in the literature as pain anxiety or fear of pain and refers to anxiety or fear directly related to the experience or anticipation of pain (Asmundson, Collimore, Bernstein, Zvolensky, & Hadjistavropoulos, 2007; Mccracken, et al., 1992). Pain anxiety comprises four dimensions including: 1) fear and dread of pain, 2) avoidance and escape behaviours associated with pain, 3) physiological responses to pain such as sweating or dizziness, and 4) cognitive anxiety due to pain (i.e. inability to concentrate, unwanted thoughts) (Mccracken, et al., 1992). As fear associated with a painful event is considered a normal reaction, fear of pain is generally considered to occur along a continuum, with those at one end experiencing limited to no anxiety related to pain and those at the other end experiencing pathological fear of pain (Asmundson, et al., 2007). As most people experience some pain with upper limb injury, many will also experience some degree of pain anxiety as part of the recovery process.

The behavioural component of fear of pain was described by Lethem, et al. (1983) in the development of their Fear-Avoidance Model of Exaggerated Pain Perception (Lethem, Slade, Troup, & Bentley, 1983). Within this model, Letham, et al. (1983) postulate the experience of pain is not necessarily correlated with organic tissue damage (e.g. the severity of injury is not necessarily equal to the severity of pain experienced by the individual). As such, the experience of pain may appear to be exaggerated in some people. Letham, et al. attributed this incongruence between pain intensity and severity of injury to the individual’s emotional response to pain, namely fear (Lethem, et al., 1983). As with other fear responses, fear can lead to
avoidance behaviours, which in turn may lead to increasingly limited activity. As the injury heals and the fear remains, the pain behaviours are no longer responses to painful stimuli, but become a reaction to the fear itself (Lethem, et al., 1983). This becomes particularly problematic when recovering from hand injuries like tendon repairs that require strict adherence to home exercise programs, often involving movement of involved fingers (Gelberman, et al., 1986). Fear of pain resulting in avoidance of movement (and decreased participation in the exercise program) following these injuries can result in elongation of tendon repairs or adhesion of soft tissues (Gelberman, et al., 1986), leading to potentially poorer long-term functional use of the hand.

Pain anxiety may have a significant impact on recovery and long-term outcome following traumatic injuries. For instance, pain anxiety has been associated with higher levels of disability following low back pain (Waddell, Newton, Henderson, Somerville, & Main, 1993). In relation to upper limb injuries, pain anxiety has been associated with higher levels of disability following forearm fractures (Bot, et al., 2011), wrist fractures (Niekel, Lindenhovius, Watson, Vranceanu, & Ring, 2009), and discrete, non-traumatic hand diagnoses (such as carpal tunnel syndrome, tendinitis, and trigger finger)(Ring, et al., 2006). In particular, pain anxiety may adversely influence individuals’ abilities to complete specific tasks following hand fractures (Keogh, Book, Thomas, Giddins, & Eccleston, 2009). These findings present a consistent picture of the negative influence of pain anxiety on disability following upper limb conditions.

Pain anxiety may also influence the experience of pain during the recovery from traumatic injuries. Increased levels of pain anxiety have been shown to lead to increased impact of pain (Arntz, Van den Hout, Van den Berg, & Meijboom, 1991), “suffering” component of pain experience (Fordyce, 1976), and ratings of perceived pain intensity (Weisenberg, Aviram, Wolf, & Raphaeli, 1984). Pain anxiety may also play a crucial role in the development of chronic pain (Vlaeyen & Linton, 2000). Given the potential pain anxiety has to influence health-related behaviour and pain, pain anxiety is a crucial concept to address both within the research and treatment of upper limb injuries.
3.3.3.3 Other related forms of anxiety

Two other forms of anxiety are mentioned in the literature relating to anxiety and recovery from traumatic hand injuries. Although they were not included in this study, they are mentioned in order to place the study in the context of the current upper limb literature.

Pain catastrophising

Pain catastrophising is the tendency to exaggerate or ruminate about the seriousness of the pain experience (Chaves & Brown, 1987). Pain catastrophising has three dimensions: magnification, rumination, and helplessness (Sullivan, Bishop, & Pivik, 1995). Pain catastrophising is associated with helplessness and pessimism in low back patients (Rosenstiel & Keefe, 1983).

Catastrophising is implicated in heightened experiences of pain in a variety of diagnoses including soft tissue disorders (Sullivan, Stanish, Waite, Sullivan, & Tripp, 1998), whiplash injury (Sullivan, Stanish, Sullivan, & Tripp, 2002), chronic pain (Flor, Behle, & Birbaumer, 1993), and rheumatoid arthritis (Keefe, Brown, Wallston, & Caldwell, 1989). In a study of individuals with hand fractures, Keogh (2009) found that catastrophising was associated with both pain anxiety and anxiety sensitivity (see below) (Keogh, et al., 2009). Pain catastrophising was also predictive of disability following forearm fractures (Bot, et al., 2011) and peripheral nerve injuries (Novak, Anastakis, Beaton, Mackinnon, & Katz, 2011). Due to its close association with pain anxiety, catastrophising has a clear impact on recovery from traumatic injury. However, as pain anxiety was measured in Study I, catastrophising was not included due to its conceptual overlap with pain anxiety and in order to avoid placing undue emphasis on anxiety related to pain.

Anxiety sensitivity

Anxiety sensitivity is the fear of anxiety-related sensations (Reiss & McNally, 1985). This fear is generated by a belief that the sensations have harmful consequences. For example, an individual may fear that heart palpitations will lead to cardiac arrest (Asmundson & Taylor, 1996). Anxiety sensitivity has been associated with high levels of pain-related anxiety in those with chronic
musculoskeletal pain (Asmundson & Norton, 1995; Asmundson & Taylor, 1996). However, the relationship between anxiety sensitivity and upper limb injuries is limited to the findings of a study by Keogh, et al. (2009) who found that anxiety sensitivity is associated with disability following hand fractures. Further exploration of this relationship would be useful. However, anxiety sensitivity was not included in the measurement of anxiety in Study I because I was interested in measuring anxiety that was a direct reaction to injury (See Chapter 4).

3.3.4 Alternative approaches to anxiety in upper limb literature

In addition to research describing the relationship between symptoms of anxiety and traumatic upper limb injury described above, other researchers have explored emotional reactions to injury from alternative viewpoints. Two of these viewpoints include illness perceptions and patient narratives.

3.3.4.1 Illness perceptions

An alternative approach to the study of emotional reactions to injury is the exploration of patients’ beliefs and feelings about their injury experience (Weinman, Petrie, Moss-Morris, & Horne, 1996). Illness perceptions are often examined using self-report questionnaires, including the Revised Illness Perceptions Questionnaire (IPQ-R) (Moss-Morris, et al., 2002). The IPQ-R contains seven subscales which assess patients’ perceptions of their illness or injury experience including: Consequences, Timeline, Emotional Representations, Personal Control, Treatment Control, Timeline Cyclical and Illness Coherence (Moss-Morris, et al., 2002). The Emotional Representations subscale contains questions relating to emotional reactions to injury, including anxiety and depression (Moss-Morris, et al., 2002). Within this subscale, respondents are asked to indicate level of agreement with statements such as “When I think about my illness I get upset” and “My illness does not worry me” and “Having this illness makes me feel anxious” or “My illness makes me feel afraid” (Moss-Morris, et al., 2002). Although not as directly related to emotional reactions to injury, the Consequences subscale asks participants to rate the impact that their illness or injury has had on their life. Subscale questions include such things as “My illness has major consequences on my life” “My illness has serious financial
consequences” and “My illness does not have much effect on my life.” Although not directly comparable, the Consequences subscale appears to resemble a type of disability (see Chapter 2 for a description of two conceptualisations of the concept of disability). Because questions on the IPQ-R are related directly to the injury or illness experience, respondents are framing their anxiety and emotional reactions within their experience.

Illness perceptions following traumatic upper limb injuries have been documented. Chan et al. (2009) asked consecutive patients with a hand injury requiring surgical repair to complete the revised Illness Perceptions Questionnaire (IPQ-R) and the DASH (a measure of disability) (Beaton, Wright, & Katz, 2005) at the time of admission from the accident and emergency department. They found that most patients scored fairly low on the emotional representation scale, indicating low levels of anxiety and depression among this cohort (Chan, et al., 2009). However, this may simply indicate that patients had not yet had time to process the impact that a hand injury may have on their ability to complete functional tasks and participate in their normal routines. Further research may show that perceptions regarding the timeline and consequences of the injury may change over the course of recovery, and that emotional responses to the injury (like anxiety and depression) will fluctuate along with these changes. In fact, perceptions relating to six of the subscales on the IPQ-R (identity, emotional representations, consequences, controllability, illness coherence and causes) dramatically changed over a period of six months in a study of participants who had sustained general traumatic injury (Lee, Chaboyer, & Wallis, 2010). Illness attitudes have also been evaluated in individuals with limitations in hand function due to musculoskeletal hand problems (Hill, Dziedzic, Thomas, Baker, & Croft, 2007); results indicated that a belief that the hand condition had a profound impact on life was consistently associated with poorer health (as measured by the Arthritis Impact Measurement Scales 2) (Hill, et al., 2007). The results of these studies reveal information about anxiety following injury that is not uncovered when anxiety is measured as a collection of psychiatric symptoms.

Although information about illness attitudes/beliefs was initially included in data collection for Study I (Chapter 5), this data was not included in the final analysis.
(Chapter 4 includes an explanation of why this data was not included and Appendix B contains a brief analysis of this data).

3.3.4.2 Patient narratives

A third approach to the study of anxiety in those with traumatic hand injuries has been to explore the experience of anxiety through narratives and thematic analysis. One of the main aims of this body of research has been to identify sources of distress or anxiety following traumatic hand injuries (Gummesson, Atroshi, & Ekdahl, 2003; Gustafsson & Ahlstrom, 2004; Gustafsson, Persson, & Amilon, 2002; Gustafsson, et al., 2000; Haese, 1985). Gustaffson et al. (2000) found that a variety of sources of distress were reported in the first two weeks following injury by patients who had suffered traumatic hand injuries severe enough to require inpatient treatment including: difficulty completing daily activities, uncertainty about hand function in the future, dependency on others for help, pain, trauma experience, involuntary inactivity, and appearance of the hand (Gustafsson, et al., 2000). Similar sources of anxiety were found in an earlier qualitative study of the psychological aspects of less severe hand injuries like tendon and muscle repairs (Haese, 1985). These studies provide valuable information for clinicians involved in the treatment of those with upper limb injuries as it allows them to directly address the potential sources of distress or anxiety in their patients. In addition, the anxiety related to the themes identified by Gustafsson, et al. and Haese (1985) could be quantified to determine the prevalence of this type of context-specific anxiety in those with traumatic upper limb injuries.

Other sources of anxiety have been identified by researchers exploring specific aspects of the recovery experience. In particular, anxiety related to the appearance of an upper limb injury has been reported in several studies (Grunert, Smith, et al., 1988; Gustafsson, et al., 2000; Rumsey, Clarke, White, & Hooper, 2003). Grunert reported that nearly one-third of subjects with severe upper limb injuries continued to experience anxiety related to the appearance of their injured limb 18 months post-injury (Grunert, Devine, et al., 1992), indicating that appearance continues to create anxiety in some for many months following injury. Grunert and colleagues (1988) also found very specific sources of anxiety in a study evaluating
sexual dysfunction following the most severe hand injuries including deformity anxiety (fear that the appearance of the replanted digit was repulsive - 52%), replant anxiety (fear that the replanted digit would fail and be reamputated - 9%), and contagious anxiety (the partner’s fear that being touched by the injured hand would result in a similar disfigurement - 39%) (Grunert, Devine, Matloub, Sanger, & Yousif, 1988b). These specific sources of anxiety following traumatic upper limb injuries may have a strong impact on those recovering from the most severe injuries.

3.4 Anxiety following traumatic upper limb injuries

While the research related to anxiety following traumatic upper limb injuries has explored many of the forms of anxiety described above, there are two observable trends within this field.

3.4.1 Previous research has focused on symptoms of PTSD and GAD

First, research in this area has tended to focus on symptoms of two particular forms of pathological anxiety, PTSD and GAD (See sections on PTSD 3.3.2.1 and GAD 3.3.1.1 above). Screening tools used to measure these forms of anxiety in health-related research, such as the Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983) or the Impact of Event Scale- Revised (IES) (Horowitz, Wilner, & Alvarez, 1979), typically employ questions that mirror the symptoms of these disorders on the DSM-IV. The IES was developed prior to the DSM-IV and only covers 2 of the 4 domains of PTSD described by the DSM-IV. However, a revised version of the IES developed by Weiss and Marmar in 1997 includes questions that cover the remaining clusters of symptoms on the DSM-IV; (Weiss & Marmar, 1997). While PTSD and GAD may be important in addressing the relationship between anxiety and disability following traumatic upper limb injuries, limiting the exploration to these two forms of anxiety restricts our understanding of the role that non-pathological forms of context-specific anxiety may play in the experience of recovery from traumatic upper limb injuries. The introduction to Chapter 5 provides further discussion of this issue.
3.4.2 Previous research has focused on those with severe injuries

A second limitation of the literature relating to anxiety following traumatic upper limb injuries is the sparse research focused on those with minor to moderate traumatic upper limb injuries. Research has instead focused on 3 groups: 1) those with the most severe injuries, 2) those with injuries less severe than the first group but severe enough to require hospitalisation, and 3) those with unexplained upper limb pain.

Perhaps due to the severe nature of the symptoms such as flashbacks and nightmares seen with PTSD, many of the studies relating psychological reactions to traumatic upper limb injuries focus on those with the most severe injuries, leaving the applicability of these results to those with more minor injuries or those with non-traumatic upper limb pain in question. For instance, one of the most prolific research groups in this area, Grunert et al., have completed a series of studies examining post-injury distress in patients seen by the hand surgery department at a large American teaching hospital. The injuries sustained by participants in these studies are described as “severe” and include such diagnoses as amputations, multiple trauma, crush injuries and lacerations (Grunert, Devine, et al., 1988a, 1988b; Grunert, Devine, et al., 1992; Grunert, et al., 1989; Grunert & Dzwierzynski, 1997; Grunert, Hargarten, et al., 1992; Grunert & Maksud, 1993; Grunert, Matloub, Sanger, Yousif, & Hettermann, 1991; Grunert, Smith, et al., 1988). Similar patient populations are reported in other studies of psychological reactions to upper limb injuries (Cederlund, Thorén-Jönsson, & Dahlin, 2010; Cheung, et al., 2003; Clay, et al., 2010; Desmond, 2007; Grob, Papadopulos, Zimmermann, Biemer, & Kovacs, 2008; Jaquet, et al., 2005; Meyer, 2003; Opsteegh, et al., 2010; Paterson & Burke, 1995; Rusch, Grunert, Sanger, Dzwierzynski, & Matloub, 2000). The injuries represented in these studies are typically mutilating and may involve events that could be expected to be considered traumatic for most people (e.g. traumatic amputation of the hand due to a work injury). As such, it is perhaps unsurprising that there has been a focus on the emotional and psychological reactions of individuals to more severe injuries.

A second group of authors have reported on the psychological state of individuals who have sustained less severe injuries but who have still been admitted to
hospital, suggesting that the injuries sustained by this cohort either required surgery or were severe enough to warrant a hospital admission (Bear-Lehman & Poole, 2011; Gustafsson & Ahlstrom, 2004, 2006; Gustafsson, et al., 2003; Gustafsson, et al., 2002; Jaquet, et al., 2001; Lam, et al., 2011; Richards, et al., 2011; Rusch, Dzwierzynski, Sanger, Pruit, & Siewert, 2003; Sonmez, et al., 2010; Victorson, et al., 2005). While there are indications that the severity of injury does not predict resiliency or adaptation to injury (Grunert, Smith, et al., 1988; Hannah, 2011; Meyer, 2003), it is possible that the anxiety experienced by those with severe injuries may be qualitatively different than that experienced by those with less severe injuries. Further research to explore this issue would be useful.

A third group of researchers have explored anxiety symptoms in individuals who suffer from idiopathic, or unexplained, upper limb pain. Ring, Vranceanu and colleagues have evaluated the relationship between psychosocial variables and non-traumatic pain disorders in the arm (Ring, et al., 2006; Ring, Kadzielski, Malhotra, Lee, & Jupiter, 2005; Vranceanu, Barsky, & Ring, 2009; Vranceanu, Jupiter, Mudgal, & Ring, 2010; Vranceanu, Safren, Zhao, Cowan, & Ring, 2008). They have found that patients with unexplained pain tend to exhibit higher levels of cognitive anxiety and overall pain anxiety than those with a diagnosed, discrete pain (Ring, et al., 2005; Vranceanu, et al., 2009). In addition, those with undiagnosable pain or those who have pain out of proportion to their injury are more likely to screen positive for somatoform disorders, posttraumatic stress disorders, and pain disorders (Vranceanu, et al., 2008). The presence of anxiety in this population was related to increased reported disability (Ring, et al., 2006; Vranceanu, et al., 2008). Given the unexplained nature of the pain described in this group of studies, it is possible that the forms of anxiety experienced by this group may also differ significantly from the anxiety experienced by those with mild to moderate traumatic upper limb injuries that have a clear diagnosis such as finger sprains, wrist fractures, or hand fractures.

3.5 Clinical implications

From a clinical perspective, it is important to have a good understanding of both the prevalence of various types of anxiety following traumatic upper limb injuries and what some of the potential sources of this anxiety might be. PTSD and GAD are
potentially serious mental health conditions that may have significant implications for recovery from injury and for future quality of life. However, it is also important for clinicians to be aware of less severe forms of anxiety that may be relevant to those who have sustained traumatic upper limb injuries. In addition, while anxiety is very individual in nature – what may cause anxiety in one individual may have a limited impact for another – it is important for clinicians to be aware of aspects of recovery from upper limb injuries that have been identified as potentially distressing. This will allow clinicians to initiate conversations with patients about these potential sources of anxiety and may prevent some forms of anxiety from occurring during the recovery process.

3.6 Chapter summary

Anxiety is a multifaceted and complex phenomenon that is described within the literature relating to traumatic upper limb injuries in a variety of ways. However, while each of these ways of exploring anxiety provides valuable information, none provides a comprehensive view of anxiety in this population. Although much of the quantitative research related to traumatic upper limb injuries focuses on PTSD or GAD in those with the most severe injuries, more recent work has expanded the definition of anxiety to include forms of non-pathological anxiety that is linked to the experience of recovering from a traumatic upper limb injury. Unfortunately, few of these studies have included participants with the wide range in severity of injuries seen in the typical outpatient hand therapy setting.

While these quantitative studies provide information about the prevalence of anxiety and its impact on disability and pain, they provide limited information regarding the actual source of the anxiety from the patient’s perspective. Qualitative studies have shown that patients report a variety of sources of anxiety while recovering from a traumatic injury upper limb injury that may potentially be missed in studies that focus purely on the measurement of symptoms of anxiety disorders. Due to the design of these studies, none is able to investigate the association between sources of anxiety they identify and the degree or prevalence of anxiety related to the sources seen in those with upper limb injuries. Two studies looking at injury/illness perceptions in patients with hand injuries have attempted to fill in some of these gaps by providing a quantitative measure of
specific aspects of an illness or injury experience, including a general form of anxiety. However, these studies also fail to define type of anxiety or relationship of anxiety to disability and pain. In conclusion, the literature relating to anxiety following traumatic upper limb injuries is focused on the measurement of symptoms of pathological forms of anxiety in those with severe injuries. Further quantitative and qualitative research exploring non-pathological anxiety in those with mild to moderate traumatic upper limb injuries would help to uncover the sources of non-pathological anxiety in this population and the links between non-pathological anxiety and disability.
4.1 Chapter overview

In this chapter, I iterate the rationale for my concentration on anxiety during Phase 1 of this thesis, focusing on my experiences as a practicing hand therapist. I describe the properties of the type of anxiety I was interested in exploring and how these properties led to my choice of anxiety measures in Study I. I detail the psychometric properties of the tools used to measure anxiety and disability in Study I. This information is included as a separate chapter to Study I (Chapter 5) for three reasons: 1) to give voice to the influence that my experiences as a clinical hand therapist had on the type of anxiety I was interested in researching, 2) to avoid allowing detailed information about the psychometric properties of the measurements to disrupt the flow of Chapter 5, and 3) Study I was published as an article (See Chapter 5), and space constraints only allowed for inclusion of brief details of measures in the published paper.

4.2 Purpose of Study I

The purpose of Study I was to explore the prevalence of non-pathological anxiety following mild to moderate traumatic upper limb injury and to determine if there was a link between these forms of anxiety and disability in the early recovery period (≤ 12 weeks since injury). As a clinician, I witnessed varying degrees of anxiety relating to injury and aspects of recovery in many individuals I treated over the years. While the literature related to traumatic hand injuries highlights anxiety disorders such as Post-Traumatic Stress Disorder (PTSD) and Generalised Anxiety Disorder (GAD) in those with the most severe injuries (see Chapter 2), the anxiety reported by those with milder upper limb injuries appeared to be more related to the actual recovery from their injury than to the classical symptoms of nightmares and flashbacks associated with PTSD. For instance, some individuals described fear about the future function of their hand while others reported...
concern about the appearance of scars. The common thread in these conversations was that people used words like worry, fear, and bother to describe their emotions. As the words worry and fear are used to describe symptoms of anxiety both within the diagnostic criteria for anxiety described by the DSM-IV (American Psychiatric Association, 2000) and by popular media (WebMD, 2015; Wikipedia, 2015), I determined that my focus for Study I was the manifestation of non-pathological anxiety in people with mild to moderate upper limb injuries.

4.2.1 What is anxiety (revisited)?
As described in Chapter 3, a number of non-pathological forms of anxiety have been identified in health-related research relating to recovery from an injury. In order to define the type(s) of anxiety I was interested in, I considered multiple criteria. Being specifically interested in non-pathological anxiety, I eliminated the anxiety disorders described in the DSM-IV (American Psychiatric Association, 2000) and then created a list of my assumptions about the characteristics of the type of anxiety I wanted to explore:

- The anxiety was a normal reaction to a traumatic injury and the recovery experience.
- This anxiety may present along a continuum from mild to severe
- The severity of anxiety was not necessarily related to the severity of injury
- The predominant presentation of the anxiety was cognitive or affective symptoms.
- The anxiety was not a pathological form of anxiety as described by the DSM (i.e. PTSD or GAD).
- Individuals would recognize and self-report their anxiety as an emotion related to their recovery from a traumatic upper limb injury.

4.2.2 How was anxiety measured in Study I?
As I was unable to find a single form of anxiety that met all these criteria, I measured three types of recovery-related anxiety in the hopes of gathering a comprehensive view of the type of anxiety expressed by my patients: state anxiety, pain anxiety, and post-injury anxiety. State anxiety served to evaluate any change in general anxiety since the time of injury, thus representing anxiety during the
As pain is usually a component of recovery from a traumatic injury and would therefore be directly related to the injury and recovery process, I included pain anxiety. I was unable to find a measure of anxiety that I felt adequately encapsulated anxiety related to other aspects of injury recovery without focusing on symptoms of PTSD (e.g. nightmares and flashbacks). Therefore, I created the Recovery-Related Anxiety Questionnaire (RRAQ) based upon aspects of recovery defined in previous research as distressing by individuals who had experienced severe hand injuries (Grunert, Devine, Matloub, Sanger, & Yousif, 1988a, 1988b; Gustafsson, Persson, & Amilon, 2000); respondents to the RRAQ are asked to directly relate their worry or bother to those aspects (see Chapter 5 for a description of the RRAQ development). The form of anxiety measured by the RRAQ is referred to as post-injury anxiety in this thesis. I was also interested in whether a general tendency to respond to events with increased anxiety (trait anxiety or neuroticism) was related to increased disability. I chose to measure trait anxiety/neuroticism as a form of non-pathological generalised anxiety.

### 4.2.2.1 State & Trait Anxiety Inventory (STAI-Y)

Generalised anxiety symptoms (trait anxiety or T-Anxiety) and situational anxiety symptoms since injury (state anxiety or S-Anxiety) were screened using the State and Trait Anxiety Inventory (STAI-Y)(Spielberger, 1983). The STAI-Y was developed from the original STAI-X (Spielberger, 1970) to improve the internal consistency of some subscale items (Oei, Evans, & Crook, 1990). The STAI-Y comprises two 20-question subscales with one subscale asking respondents to describe how they generally feel (T-Anxiety) and the other focused on how they feel now (S-Anxiety) related to common symptoms of anxiety. Respondents are asked to rate the intensity of their feelings for each anxiety-present or anxiety-absent item on a 4-point scale ranging from 1 (*not at all*) to 4 (*very much so*). Total scores are calculated for each subscale by reversing the scores for each anxiety-absent item and then summing the scores (total subscale score range 20-80 for both the S-Anxiety and the T-Anxiety subscales).
The STAI-Y has demonstrated consistently strong psychometric properties in a variety of populations such as pre-/post-surgical candidates, individuals with generalised anxiety disorder, and the general population (Kabacoff, Segal, Hersen, & Van Hasselt, 1997; Spielberger, 1983; Stanley, Novy, Bourland, Beck, & Averill, 2001; Vagg, Spielberger, & Ohearn, 1980). In a recent psychometric review, Barnes et al. (2002) reported good internal consistency of both subscales [α (T-Anxiety) = .72-.96 and α (S-Anxiety) = .65-.96] with more variable test-retest reliability for S-Anxiety than T-Anxiety [r (T-Anxiety) = .73-.96 and r (S-Anxiety) = .16-.96]. However, the authors note that S-Anxiety is expected to vary more as it is dependent upon situational factors. This may be controlled to some extent by ensuring stable test conditions during subsequent testing. Situational anxiety (S-anxiety) in Study I was defined as anxiety experienced since time of injury. Scores for the STAI-Y show strong correlations with other measures of trait anxiety like the State-Trait Inventory for Cognitive and Somatic Anxiety (Gros, Antony, Simms, & McCabe, 2007). Moderate to large correlations have also been found between the STAI-Y subscales and other measures of general anxiety such as the Penn State Worry Questionnaire (Kabacoff, et al., 1997; Stanley, et al., 2001), the Worry Scale (Kabacoff, et al., 1997; Stanley, et al., 2001), and the Beck Anxiety Inventory (Stanley, et al., 2001).

I used both the State and Trait portions of the STAI-Y due to its strong psychometric properties in a wide variety of populations with health-related issues. In addition, the State anxiety portion of the tool provided insight into anxiety that was directly linked to recovery from upper limb injury due to the instructions given to participants to consider their responses within the timeframe since injury.

4.2.2.2 Pain Anxiety Symptoms Scale (PASS-20)

Anxiety related specifically to pain was assessed with the shortened version of the Pain Anxiety Symptoms Scale (PASS-20)(McCracken & Dhingra, 2002). The original Pain Anxiety Symptoms Scale (PASS) was designed to measure the multiple facets of pain anxiety in chronic pain patients including: 1) cognitive anxiety, 2) escape-avoidance behaviours, 3) fear of pain, and 4) physiological
symptoms of anxiety (Mccracken, Zayfert, & Gross, 1992). The PASS demonstrates moderate to large correlations with conceptually related measures of pain or anxiety (Crombez, Eccleston, Baeyens, Van Houdenhove, & Van den Broeck, 1999; McCracken, Faber, & Janeck, 1998; McCracken, Gross, Aikens, & Carnrike, 1996). Reliability of the PASS is good with reported internal consistency of the scale items $\alpha = .91-.94$ (Crombez, et al., 1999; Mccracken, et al., 1992; Roelofs, et al., 2004). However, the construct validity of the four factor structure of the PASS and the convergent validity of the items within the Physiological subscale have been questioned (Larsen, Taylor, & Asmundson, 1997).

In contrast, the shorter PASS-20 consistently upholds the four factor structure intended by the original authors (Abrams, Carleton, & Asmundson, 2007; Coons, Hadjistavropoulos, & Asmundson, 2004; Roelofs, et al., 2004). The PASS-20 consists of 20 items with four subscales of five items each representing the four aspects of pain-related anxiety described above (McCracken & Dhingra, 2002). Respondents are asked to rate how often they do or experience each item on a 6-point scale of 0 = never to 5 = always. The total score ranges from 0 to 100 and is computed by summing ratings across the entire measure. Subscale scores are computed by summing ratings for each item within the subscale (range 0-25). Cross-sectional correlations between the PASS and the PASS-20 are very strong ($r = .97-.98$) and the subscales of the PASS-20 demonstrate good internal consistency despite the reduction in number of items from the original subscales ($\alpha = .83-.92$) (McCracken & Dhingra, 2002; Roelofs, et al., 2004). Test-retest reliability in a variety of pain populations over a period of three months is adequate ($r = .68$) (Coons, et al., 2004).

Scores on the PASS-20 show moderate to large correlations between conceptually related measures of pain and anxiety such as the Fear of Pain Questionnaire (Abrams, et al., 2007), the Pain Catastrophising Scale (Keogh, Book, Thomas, Giddins, & Eccleston, 2009; McCracken & Dhingra, 2002; Mccracken, et al., 1992), the Negative Affect subscale of the Multidimensional Pain Inventory (Coons, et al., 2004) and the Anxiety Sensitivity Index (Abrams, et al., 2007; Coons, et al., 2004; Keogh, et al., 2009). Small to moderate correlations have been established between the PASS-20 and measures of health and disability (Sickness Impact Profile and the
Disability subscale of the Multidimensional Pain Inventory) (Coons, et al., 2004; McCracken & Dhingra, 2002).

In addition to its applicability in chronic pain patients, the PASS-20 has been used to evaluate pain anxiety in individuals with hand fractures (Keogh, et al., 2009), community physiotherapy patients (Coons, et al., 2004) and in a community sample of undergraduate students (Carleton & Asmundson, 2009). The shortened version of the PASS was used in Study I due to its stronger psychometric properties, its decreased response burden, and its proven application within related study populations.

4.2.2.3 Recovery-Related Anxiety Questionnaire (RRAQ)

Anxiety directly related to the context of recovering from a traumatic upper limb injury was measured using a study-specific measure, the Recovery-Related Anxiety Questionnaire. The RRAQ is an 11-item measure based upon aspects of recovering from traumatic upper limb injuries previously identified in the literature (Grunert, et al., 1988a, 1988b; Gustafsson, et al., 2000). (See Chapter 5 for a detailed description of this measure.)

4.2.3 How was disability measured in Study I?

Disability was defined based upon the definition provided by the International Classification of Functioning, Disability, and Health (ICF) (see Chapter 2). Within this model, I used the QuickDASH to define disability because it was specifically designed to evaluate the three realms of disability defined by the ICF: impairments, activity limitations, and participation (Dixon, Johnston, McQueen, & Court-Brown, 2008).

4.2.3.1 Disabilities of the Arm, Shoulder and Hand (QuickDASH)

Functional upper limb disability was evaluated using the short form of the Disabilities of Arm, Shoulder and Hand (QuickDASH) (Beaton, Wright, & Katz, 2005). The original DASH consists of 30 items and was designed to provide a measure of symptoms and functional ability following upper limb injuries (Hudak, et al., 1996). Numerous studies have shown strong correlations between the DASH
and established measures of disability and upper limb function like the SF-36, the Brigham Carpal Tunnel questionnaire, and the American Shoulder and Elbow Surgeon’s Elbow form (Angst, et al., 2009; Beaton, et al., 2001; MacDermid, Richards, Donner, Bellamy, & Roth, 2000; SooHoo, McDonald, Seiler, & McGillivary, 2002). While the DASH demonstrates excellent validity, the internal consistency of items on the DASH is high to very high (Cronbach’s alpha = 0.88 to .98), indicating possible item redundancy (Gummesson, Atroshi, & Ekdahl, 2003; Hunsaker, Cioffi, Amadio, Wright, & Caughlin, 2002).

The shorter QuickDASH was designed to decrease the response burden and eliminate the item redundancy found in the full-length version of the DASH (Beaton, et al., 2005). The QuickDASH consists of 11 questions covering physical function, pain, and participation restrictions on a 5-point scale ranging from 1 = no difficulty to 3 = moderate difficulty to 5 = unable. The final score is calculated using the formula \((\text{Sum of responses/Number of responses} - 1) \times 25\) and has a range from 0-100 with higher numbers indicating more disability. Gummesson, Ward, and Atrosi (2006) showed strong cross-sectional correlations between the DASH and the QuickDASH (0.96-0.99), with the QuickDASH demonstrating slightly higher responsiveness to change than the DASH. The internal consistency of the items is improved on the QuickDASH compared to the DASH (Cronbach’s alpha = 0.88 to 0.93)(Beaton, et al., 2005; Gummesson, Ward, & Atroshi, 2006; Wong, Fung, Chu, & Chan, 2007) and test-retest reliability after 6-21 months is excellent as measured before and after elective surgery of the hand, wrist, or shoulder (intraclass correlation coefficient ≥ .93)(Gummesson, et al., 2006).

The QuickDASH demonstrates moderate to high correlations with established joint-specific measures of function (Patient-Rated Wrist Evaluation, Patient-Rated Elbow Evaluation) (Angst, et al., 2009; Beaton, et al., 2005), pain (Shoulder Pain and Disability Index, Brigham and Women’s Carpal Tunnel Questionnaire)(Beaton, et al., 2005), and disability (SF-36) (Angst, et al., 2009). Niekel et al. (2009) recently found small to medium correlations between the QuickDASH and measures of anxiety (Pain Anxiety Symptoms Scale, Pain Catastrophising Scale) and depression (Centers for Epidemiological Studies – Depression). The Quick DASH was chosen for this study due to its strong psychometric properties, low
response burden, and frequent application in studies of upper limb pathology. The validity of the QuickDASH within a New Zealand population has been established (Polson, Reid, McNair & Larmer, 2010; Heford, Abbott, Arnold & Baxter, 2012)

4.3 Chapter summary

In this chapter, I provided a summary of the rationale behind the focus on the concept of anxiety in Study I. I also described the psychometric properties of the measures chosen to evaluate anxiety in Study I and explained why I chose each tool. Appendix A includes the full questionnaire provided to participants in Study I (see Chapter 5 for the full description of Study I). The questionnaire also includes the Consequences, Treatment Control, Personal Control, and Emotional Representations subscales from the Illness Perceptions Questionnaire – Revised (Moss-Morris, et al., 2002). However, once Study I began, I questioned whether data collected using the IPQ-R subscales contributed any understanding of anxiety. As they did not, these data were not reported in Study I. Results from the IPQR data from Study I are summarized in Appendix B. The full design and results of Study I, ‘Recovery-related anxiety and disability following upper limb injury: The importance of context’ are presented in the following chapter.
Chapter 5

Study I: Recovery-Related Anxiety and Disability Following Upper Limb Injury: The Importance of Context

5.1 Chapter overview

In this chapter I present Study I, a quantitative study that measures the prevalence of four forms of non-pathological anxiety (state, trait, pain, and post-injury anxiety) in a population of individuals with mild to moderate upper limb injuries. I describe the design of the study and report the prevalence of anxiety and the correlations between each form of anxiety and a measure of disability. The results of a multivariate analysis intended to predict variability in disability scores are recounted. I discuss the implications of the findings from both a clinical and a research perspective.

This chapter was published as a peer-reviewed article in Disability & Rehabilitation. As primary author, I was responsible for obtaining ethical approval, designing the study, collecting all data, data analysis, preparing drafts of the manuscript, submitting drafts to the journal, and responding to all peer review comments. My supervisors provided editorial feedback on the design of the study, the ethical approval application, and on all drafts of this paper, verified statistical results and analysis, and checked my responses to the peer review comments. The manuscript is presented here with citations and formatting consistent with the remainder of the thesis. A copy of the published manuscript is presented in Appendix C. The full citation for the published article is:

5.2 Published Study I

5.2.1 Introduction

Our hands function as emotional and communicative extensions of ourselves. Given this, it is unsurprising that traumatic upper limb injuries are frequently associated with psychological distress (Grunert, et al., 1992; Gustafsson & Ahlstrom, 2004). One common manifestation of psychological distress following traumatic injuries is anxiety, which is typically manifested by excess worry (Grunert, et al., 1992; Gustafsson & Ahlstrom, 2004). Higher levels of anxiety have been linked to intensified pain experiences (Keogh, Book, Thomas, Giddins, & Eccleston, 2009) and increased disability (Clay, et al., 2010; Ring, et al., 2006) following severe traumatic upper limb injuries. However, these findings may not apply to a typical hand therapy patient, many of whom have mild to moderate traumatic injuries and whose anxiety may be very context specific, because: 1) the portrayal of anxiety in this research area relies heavily on symptoms of psychiatric anxiety disorders; 2) there has been a focus on individuals with severe traumatic injuries; and 3) there is limited published data on the prevalence of anxiety following upper limb injuries.

There is some debate surrounding the nature of anxiety. Many psychologists argue that anxiety should be viewed along a continuum without an artificial cutoff determining “pathological” versus “non-pathological” anxiety. However, one of the most commonly cited tools used to describe anxiety, the Diagnostic and Statistical Manual (DSM) of the American Psychiatric Association (American Psychiatric Association, 2000), identifies a set of named anxiety-related disorders such as Generalized Anxiety Disorder (GAD) and Post-Traumatic Stress Disorder (PTSD), and describes symptoms and “pathological” diagnostic criteria for each of these disorders. Within the DSM, the psychological symptoms of these disorders are described in terms of extremes (“clinically significant distress,” “severe and persistent” symptoms, and “excessive anxiety and worry”) (American Psychiatric Association, 2000). These psychological symptoms are often linked to somatic criteria (such as muscle tension, trembling, or twitching) or described as being “out of proportion to the actual...event” (American Psychiatric Association, 2000). The DSM disorders typically consider symptoms out of context to a specific event with the exception of the phobias, PTSD and Acute Stress Disorder (ASD). For the
purposes of this study, *anxiety disorder(s)* will be used to describe anxiety forms similar to those described in the DSM that are focused on more extreme manifestations of somatic or cognitive symptoms.

In contrast, anxiety at the lower end of the continuum may be proportional to the inciting event, occur only in association to activities or thoughts directly impacted by the event, and cause few somatic symptoms. In this study, 'recovery-related anxiety' will be used to describe forms of anxiety on the lower end of this continuum related to traumatic injury and not otherwise described in the DSM. Recovery-related anxiety constructs have been explored in individuals with traumatic upper limb injury and range from fear of re-injury (Grunert, et al., 1992) to deformity anxiety (Grunert, Devine, Matloub, Sanger, & Yousif, 1988a) to anxiety related specifically to the experience of pain (Keogh, et al., 2009; Niekel, Lindenhovius, Watson, Vranceanu, & Ring, 2009; Ring, et al., 2006). The milder presentation of recovery-related anxiety may lead healthcare professionals and others to view it as an understandable or 'normal' reaction to traumatic injury. However, some forms of recovery-related anxiety, such as pain anxiety, have been associated with increased pain (Keogh, et al., 2009) and disability (Ring, et al., 2006) in those with upper limb injuries, indicating that recovery-related anxiety may result in worse outcomes for those with upper limb injuries even in the absence of a pre-injury or post-injury anxiety disorder.

Unfortunately, recovery-related anxiety may be difficult to measure as different aspects of recovery may be anxiety-inducing for different people. As a result, the measures commonly used to identify anxiety following traumatic upper limb injuries are often based on the symptoms of the DSM-based anxiety disorders (American Psychiatric Association, 2000; Clay, et al., 2010). For instance, the Hospital Anxiety and Depression Scale (HADS) is a psychological measure designed to be administered to those experiencing a physical illness or injury (Snaith, 2003; Zigmond & Snaith, 1983). Anxiety-related statements on the HADS mirror the symptoms of GAD described in the DSM including: “Worrying thoughts go through my mind” and “I feel restless as if I have to be on the move” (Zigmond & Snaith, 1983). Respondents are not asked to relate these symptoms specifically to their
injury or recovery experience, instead focusing on how they have generally felt over the past fortnight. As recently pointed out by Vranceanu et al., the stigma associated with words and phrases used within the medical community may have a strong influence on the responses provided by patients (Vranceanu, Elbon, & Ring, 2011). In this case, it is possible that respondents may be reluctant to endorse a symptom that appears to reflect their general mental state when they perceive any anxiety they may feel to be related only to the experience of recovering from their injury. The reliance on measures assessing symptoms of anxiety disorders out of context to the injury and recovery limits comprehension of other, milder forms of recovery-related anxiety that may be experienced by patients with minor to moderate traumatic upper limb injury.

Because many of the studies examining anxiety following traumatic limb injuries focus on the types of extreme symptoms described in diagnoses like PTSD, these studies also tend to focus on those with severe injuries. For example, the extreme symptoms of anxiety disorders such as the nightmares and flashbacks found in PTSD are common following amputations or severe, mutilating injuries of the hand (Cheung, Alvaro, & Colotla, 2003; Grunert, Devine, et al., 1988a; Jaquet, et al., 2005) and may be found after upper limb fractures (Lam, Chan, & Lam, 2011). However, the less traumatizing nature of more minor traumatic injuries like finger and wrist sprains makes it likely that symptoms of PTSD are less common. Unfortunately, while a few studies have reported prevalence of symptoms of anxiety disorders following minor to moderate traumatic upper limb injuries, these studies tend to report only mean and standard deviation of scores on anxiety measures (Bear-Lehman & Poole, 2011; Chaudhury, 2009) or numbers of patients who were “positive” for PTSD (Williams, et al., 2009). There is also little evidence of the distribution of recovery-related anxiety following minor to moderate upper limb injuries; while studies indicate that recovery-related anxiety is associated with disability following more mild injuries, they do not cite the prevalence of this form of anxiety in the study sample (Keogh, et al., 2009; Niekel, et al., 2009). These reporting styles make it difficult to determine the distribution of either type of anxiety and hence the scope of the problem within the population.
Given the current lack of information regarding the incidence and nature of anxieties experienced after mild-moderate traumatic upper limb injuries, the primary aims of this study were: 1) to measure the prevalence of three types of recovery-related anxiety and one form of general anxiety in a typical hand therapy clinic population and 2) to examine the cross-sectional relationship between perceived disability and types of anxiety. The 4 types of anxiety are: 1) state anxiety (anxiety experienced since injury); 2) pain anxiety; 3) anxiety or worry directly related to aspects of recovery from a traumatic upper limb injury; and 4) generalized anxiety (non-contextual). A secondary aim of this study was to report the results of initial testing using a novel measure called the Recovery-Related Anxiety Questionnaire.

5.2.2 Materials and Methods
The Lower South Regional Ethics Committee and the combined Southern District Health Board and Dunedin School of Medicine Research Advisory Group approved this cross-sectional study.

5.2.2.1 Subjects
Adults receiving treatment for a traumatic injury to the elbow, wrist or hand were invited to participate if their injury was sustained < 3 months prior. The timeframe of 3 months was selected to evaluate anxiety during the period of time when most patients are enrolled in outpatient therapy. Individuals with a wide variety of traumatic diagnoses were sought in order to simulate the patient population of a general outpatient hand therapy clinic. However, those with non-traumatic upper limb problems were excluded as it was felt that a different set of recovery-related concerns may apply to them. Additional exclusion criteria were: 1) presence of a diagnosed psychiatric anxiety disorder; and 2) inability to complete the written questionnaire in English. Participants were recruited from the Outpatient Physiotherapy Department at Dunedin Hospital between June 2010 and January 2011. A total of 164 questionnaires were handed out by clinical staff and 84 completed questionnaires were returned (response rate = 51%). Data were not collected on reasons for non-participation.
5.2.2.2 Testing protocol
Following written consent, participants completed the questionnaire in their own time and returned them by post. The questionnaire consisted of questions about demographics, the injury, self-reported disability, and the three following self-report measures. The anxiety measures were presented in a fixed order following the QuickDASH based upon the degree to which each measure related anxiety to the context of recovering from a traumatic upper limb injury as follows:

Disabilities of the Arm, Shoulder and Hand
Perceived disability was evaluated using the Disabilities of the Arm, Shoulder and Hand (QuickDASH) (Beaton, Wright, & Katz, 2005), a well-established measure of disability following upper limb injury with strong psychometric properties (Gummesson, Ward, & Atroshi, 2006). Total scores range from 0-100, with higher numbers indicating greater disability. Total scores were not calculated for participants with more than 2 missing items as recommended by the original authors (Beaton, et al., 2005; Gummesson, et al., 2006).

Pain Anxiety Symptoms Scale
Anxiety specifically about pain was assessed with the shortened form of the Pain Anxiety Symptoms Scale (PASS-20)(McCracken & Dhingra, 2002). The PASS-20 measures the multiple facets of pain anxiety and contains 4 subscales: 1) cognitive anxiety, 2) escape-avoidance behaviours, 3) fear of pain, and 4) physiological symptoms of anxiety (Mccracken, Zayfert, & Gross, 1992). Total scores range from 0-100 and are computed by summing ratings across the entire measure. The PASS-20 has been used to evaluate pain anxiety in many contexts including individuals with hand fractures (Keogh, et al., 2009), community physiotherapy patients (Coons, Hadjistavropoulos, & Asmundson, 2004), and in a community sample of undergraduate students (Carleton & Asmundson, 2009). The PASS-20 demonstrates consistently good reliability and validity within these populations (McCracken & Dhingra, 2002; Roelofs, et al., 2004).
State and Trait Anxiety Inventory
Generalised dispositional anxiety symptoms (trait anxiety or T-Anxiety) and generalised situational anxiety symptoms (state anxiety or S-Anxiety) were screened using the State and Trait Anxiety Inventory (STAI) (Spielberger, 1983). Situational anxiety (S-Anxiety) was defined as anxiety since injury in this study. The STAI has strong psychometric properties when used in a variety of populations such as pre-/post-surgical candidates, individuals with generalised anxiety disorder, and the general population (Barnes, Harp, & Jung, 2002; Kabacoff, Segal, Hersen, & Van Hasselt, 1997; Spielberger, 1983; Stanley, Novy, Bourland, Beck, & Averill, 2001; Vagg, Spielberger, & Ohearn, 1980).

Recovery-Related Anxiety Questionnaire
The Recovery-Related Anxiety Questionnaire (RRAQ) is a novel questionnaire designed specifically for this study to investigate recovery-related anxiety following traumatic upper limb injuries. The RRAQ consists of 11 questions covering a range of potentially anxiety-inducing aspects of recovery from a traumatic hand injury. The majority of the questions are based on the results of a qualitative study by Gustafsson and colleagues who identified stressors following traumatic hand injuries (Gustafsson, Persson, & Amilon, 2000). Questions were added to screen for anxiety relating to nightmares/flashbacks (Grunert, Devine, et al., 1988a), and sexual dysfunction (Grunert, Devine, Matloub, Sanger, & Yousif, 1988b), both of which have been shown to be present in some individuals following traumatic hand injuries. A final question was added to screen for anxiety relating to “Attending medical appointments with therapists, doctors, and nurses.”

Respondents are asked to rate “How much worry/bother” each statement has caused them since their injury (< 3 months) on a 5-point point scale with 1 = “None,” 2 = “A little bit,” 3 = “A moderate amount,” 4 = “Quite a bit,” and 5 = “Extreme worry or bother.” Total score was calculated by summing these scores. The terms “worry” and “bother” were selected in an attempt to emphasize the association between the emotional state and the injury without the negative connotations that may be associated with the words “anxiety” or “stress.” Participants are also able to indicate
that the statement does not apply to their situation ("N/A" = 6). For purposes of analysis, an answer of "N/A" or a missing item was scored as "None"; thus, higher scores represent a greater total amount of worry/bother across the scope of items. The total score was not calculated if 3 or more items had been missed or answered as N/A (N = 4).

5.2.2.3 Statistical methods

Z-scores were calculated to screen for outliers; no scores were outside 4 standard deviations from the mean. Descriptive statistics including mean scores and standard deviations were calculated to determine distribution of responses. Associations between disability (QuickDASH) and anxiety levels or worry were calculated using Pearson’s correlation coefficients. Pearson’s correlation coefficients were also calculated between total scores of the anxiety measures (STAI, PASS-20, and RRAQ) to establish initial content validity of the RRAQ.

A hierarchical linear multiple regression analysis was performed to determine how much variance in self-reported disability (QuickDASH) could be accounted for by trait anxiety, state anxiety, pain anxiety, and anxiety relating to the injury. Variables were entered in Step 1 based upon prior studies indicating a significant relationship with self-reported disability (T-Anxiety, S-Anxiety, pain anxiety) (Keogh, et al., 2009; Spielberger, 1983) or predicted contribution to disability (RRAQ). Several assumptions regarding the data were evaluated prior to interpretation of the results of the multiple regression analysis. Scatterplots of scores from each tool indicate a normal distribution of scores. The maximum Mahalanobis distance of 11.571 did not exceed the critical $\chi^2$ value of 18.47 for $df = 4$ (with $\alpha = .001$), indicating that there were no multivariate outliers. The moderate to high tolerances for all of the predictors (range = .388-.701) in the regression model indicates acceptable levels of multicollinearity.

5.2.3 Results

Participant demographics are presented in Table 5.1 while the descriptive statistics of the anxiety measures and normative population means are presented in Table 5.2.
Table 5.1: Demographics of study population

<table>
<thead>
<tr>
<th>Demographic</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>45 (53.6%)</td>
</tr>
<tr>
<td>Female</td>
<td>39 (46.4%)</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
</tr>
<tr>
<td>NZ European</td>
<td>72 (85.7%)</td>
</tr>
<tr>
<td>Maori</td>
<td>4 (4.8%)</td>
</tr>
<tr>
<td>other</td>
<td>8 (9.5%)</td>
</tr>
<tr>
<td><strong>Dominant side injured</strong></td>
<td>42 (50.6%)</td>
</tr>
<tr>
<td><strong>Injury type</strong></td>
<td></td>
</tr>
<tr>
<td>Fracture elbow/wrist/hand</td>
<td>25 (29.8%)</td>
</tr>
<tr>
<td>Fracture finger/thumb</td>
<td>24 (28.6%)</td>
</tr>
<tr>
<td>Laceration tendon/nerve</td>
<td>18 (21.4%)</td>
</tr>
<tr>
<td>Crush injury</td>
<td>6 (7.1%)</td>
</tr>
<tr>
<td>Other</td>
<td>10 (13.2%)</td>
</tr>
<tr>
<td><strong>Hospitalization required</strong></td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>43 (51.2%)</td>
</tr>
<tr>
<td>no</td>
<td>41 (48.8%)</td>
</tr>
<tr>
<td><strong>Mechanism of injury</strong></td>
<td></td>
</tr>
<tr>
<td>Fall from standing height</td>
<td>21 (25%)</td>
</tr>
<tr>
<td>Cut on sharp object</td>
<td>15 (17.9%)</td>
</tr>
<tr>
<td>Heavy machinery</td>
<td>14 (16.7%)</td>
</tr>
<tr>
<td>Sports/leisure</td>
<td>12 (14.3%)</td>
</tr>
<tr>
<td>Crush injury</td>
<td>9 (10.7%)</td>
</tr>
<tr>
<td>Other</td>
<td>13 (15.5%)</td>
</tr>
<tr>
<td><strong>Employment status</strong></td>
<td></td>
</tr>
<tr>
<td>Full-time</td>
<td>45 (54.2%)</td>
</tr>
<tr>
<td>Part-time</td>
<td>16 (19.3%)</td>
</tr>
<tr>
<td>Other</td>
<td>22 (26.5%)</td>
</tr>
</tbody>
</table>

5.2.3.1 Prevalence of anxiety

Scores on all anxiety measures were normally distributed. Fifty-nine percent of participants reported greater than average pain anxiety (30% = 1SD > norm; 29% 2-
Abrams (2007) calculated a cut-off of >30 to indicate high pain anxiety; 45% of this sample was above this cut-off (Abrams, Carleton, & Asmundson, 2007). Fifty-seven percent of participants in the current study reported higher than average T-Anxiety (42% = 1SD > norm; 15% = 2-3SD > norm) while 67% percent of respondents reported higher than average S-Anxiety (41% = 1SD > norm; 26% 2-3SD > norm). Mean total score of the Recovery-Related Anxiety Questionnaire suggests moderate to high levels of anxiety with 25% respondents reporting an average “moderate” level of anxiety on total score.

Table 5.2: Summary of questionnaire scores

<table>
<thead>
<tr>
<th>Questionnaire</th>
<th>Mean ± SD</th>
<th>Normative population mean</th>
<th>Reported Range</th>
<th>Possible Range</th>
<th>Cronbach Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>QuickDASH</td>
<td>45.01 ± 19.36</td>
<td>10.1 ±14.7</td>
<td>5-89</td>
<td>0-100</td>
<td>.867</td>
</tr>
<tr>
<td>PASS-20</td>
<td>28.5 ± 15.75</td>
<td>24.04 ±13.45</td>
<td>0-60</td>
<td>0-100</td>
<td>.906</td>
</tr>
<tr>
<td>S-Anxiety</td>
<td>38.83 ± 10.83</td>
<td>33.16 ± 11.69</td>
<td>21-70</td>
<td>20-80</td>
<td>.943</td>
</tr>
<tr>
<td>RRAQ</td>
<td>31.53 ± 8.70</td>
<td>N/A</td>
<td>14-47</td>
<td>11-55</td>
<td>.807</td>
</tr>
</tbody>
</table>

QuickDASH (Shortened version of Disability of the Arm, Shoulder and Hand); PASS-20 (Pain Anxiety Symptoms Scale); STAI (State & Trait Anxiety Inventory); T-Anxiety (Trait Anxiety); S-Anxiety (State Anxiety); RRAQ (Recovery-Related Anxiety Questionnaire). Normative population values as reported in: 1 = (Hunsaker, Cioffi, Amadio, Wright, & Caughlin, 2002); 2 = (Abrams, et al., 2007); 3 = (Crawford, Cayley, Lovibond, Wilson, & Hartley, 2011).

5.2.3.2 Bivariate analyses

Disability did not differ across injury types or other demographics. Associations between individual anxiety measures and disability are shown in table 3. The measures of anxiety were significantly correlated in expected directions: there was a strong correlation between state anxiety and trait anxiety and moderate to strong correlations between both state and trait anxiety and all components of pain anxiety. Pain anxiety showed a significant association with disability. The total RRAQ score was also highly associated with disability.
Table 5.3: Correlations between disability and anxiety

<table>
<thead>
<tr>
<th></th>
<th>Disability¹</th>
<th>State Anxiety</th>
<th>Trait Anxiety</th>
<th>Pain Anxiety</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Anxiety²</td>
<td>.173</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trait Anxiety³</td>
<td>.186</td>
<td>.748**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain Anxiety⁴</td>
<td>.354**</td>
<td>.533**</td>
<td>.582**</td>
<td></td>
</tr>
<tr>
<td>Recovery Anxiety</td>
<td>.446**</td>
<td>.518**</td>
<td>.456**</td>
<td>.576**</td>
</tr>
</tbody>
</table>

1) Please see Methods section for abbreviations. 2) 1 = QuickDASH total score; 2 = STAI S-Anxiety; 3 = STAI T-Anxiety; 4 = PASS-20 total score; 5 = RRAQ total score. 3) * = Correlation is significant at the .05 level (2-tailed); ** = Correlation is significant at the .001 level (2-tailed)

5.2.3.3 Multivariate analyses

As a group, the four predictor variables accounted for 29% of the variability in self-reported disability (R² = .290, adjusted R² = .253, F (4, 77) = 7.874, p = .001). However, as shown in table 5.4, only the total RRAQ total score explained a significant unique proportion of the variance in self-reported disability as an individual variable (19%).

Table 5.4: Regression analysis

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>β</th>
<th>t</th>
<th>sig</th>
<th>sr²</th>
</tr>
</thead>
<tbody>
<tr>
<td>RRAQ total score</td>
<td>1.089</td>
<td>.486</td>
<td>4.266</td>
<td>.000</td>
<td>.190</td>
</tr>
<tr>
<td>PASS-20 total score</td>
<td>.237</td>
<td>.194</td>
<td>1.511</td>
<td>.135</td>
<td>.029</td>
</tr>
<tr>
<td>T-anxiety</td>
<td>-.082</td>
<td>-.041</td>
<td>-.265</td>
<td>.792</td>
<td>.001</td>
</tr>
<tr>
<td>S-anxiety</td>
<td>-.208</td>
<td>-.118</td>
<td>-.785</td>
<td>.435</td>
<td>.008</td>
</tr>
</tbody>
</table>

5.2.3.4 Initial testing of RRAQ

Many of the individual RRAQ items demonstrated moderate to high correlations with disability (see table 5.5). All participants reported a minimum of “a little bit” of worry or bother on at least one item while more than 70% of participants reported “quite a bit” or “extreme” worry or bother on two items or more (see table 5). Face validity was supported by the high completion rate of the RRAQ (97.6%) and low rates of “N/A” response. 55.4% thought all items were applicable to them and 25.3% responded “N/A” to 1 item, 13.4% to 2 items and 4.8% to 3 items. Note that 84% of “N/A” responses were clustered around lifestyle
arrangements that apply to only a portion of the general population (1. intimacy with partner, 2. inability to play sport or instrument and 3. job-related issues). Those participants who reported “quite a bit” or “extreme” worry or bother on two or more items also reported significantly higher levels of disability (mean QuickDASH score = 49.42) than those who did not (mean QuickDASH = 34.35; t = 3.412, df = 80, p = .001). Total RRAQ score was moderately positively correlated with the other anxiety measures but the acceptable tolerances of the measures (as described above in the statistical methods) suggest that they are testing different constructs.

Table 5.5: Frequency responses for RRAQ and correlation of items with disability

<table>
<thead>
<tr>
<th>Item Description</th>
<th>N (%)</th>
<th>Correlation with disability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Problems with daily tasks (N = 84)</td>
<td>37 (44%)</td>
<td>.515**</td>
</tr>
<tr>
<td>2: Having pain (N = 84)</td>
<td>17 (20%)</td>
<td>.567**</td>
</tr>
<tr>
<td>3: Appearance of my hand/arm/finger (N = 84)</td>
<td>13 (16%)</td>
<td>.297**</td>
</tr>
<tr>
<td>4: Dependence on others (N = 83)</td>
<td>35 (42%)</td>
<td>.042</td>
</tr>
<tr>
<td>5: Decreased intimacy (N = 84)</td>
<td>12 (14%)</td>
<td>.356**</td>
</tr>
<tr>
<td>6: Inability to play sport/instrument (N = 84)</td>
<td>44 (52%)</td>
<td>.469**</td>
</tr>
<tr>
<td>7: Job-related issues (N = 84)</td>
<td>30 (36%)</td>
<td>.180</td>
</tr>
<tr>
<td>8: Boredom – involuntary inactivity (N = 83)</td>
<td>35 (42%)</td>
<td>.257*</td>
</tr>
<tr>
<td>9: Uncertainty about future function (N = 84)</td>
<td>36 (43%)</td>
<td>.368**</td>
</tr>
<tr>
<td>10: Nightmares or flashbacks (N = 84)</td>
<td>5 (6%)</td>
<td>.410**</td>
</tr>
<tr>
<td>11: Attending medical appointments (N = 84)</td>
<td>5 (6%)</td>
<td>.191</td>
</tr>
</tbody>
</table>

1) 1 = QuickDASH total score. 2) * = Correlation is significant at the .05 level (2-tailed); ** = Correlation is significant at the .001 level (2-tailed).

5.2.4 Discussion

The results of this cross-sectional study indicate that patients with traumatic injuries typical of a hand therapy clinic report more recovery-related anxiety (including pain anxiety, state anxiety, and context-specific anxiety) than general anxiety (trait anxiety) symptoms. In addition, recovery-related anxiety is more strongly correlated with higher levels of current disability than general anxiety.
symptoms for people with upper limb injuries that would be considered mild to moderate. These results suggest that it is important to identify recovery-related forms of anxiety in those with less severe injuries. Most previous literature evaluating the relationship between disability and psychological distress following traumatic upper limb injuries has focused on those with severe injuries and used measures reliant on symptoms of anxiety disorders specified by the DSM, which are often not directly related to the injury and may be more general in nature. Grunert and colleagues reported that 94% of those who had suffered severe upper limb injuries demonstrated at least one significant symptom of PTSD (Grunert, Smith, et al., 1988) while Williams found that nearly a third of patients seen in an outpatient hand therapy clinic met the diagnostic criteria for PTSD (Williams, et al., 2009). In contrast, only 6% of patients in our study reported notable nightmares or flashbacks. General anxiety rates have been more variable in previous studies of people with relatively severe injuries. Grunert found generalized anxiety in 31-48% of patients with severe hand injuries in the first 3 months following injury (Grunert, et al., 1992) while Gustafsson and colleagues found 22-32% of patients with injuries severe enough to require surgery demonstrate “possible” to “definite” anxiety (Gustafsson & Ahlstrom, 2006; Gustafsson, Amilon, & Ahlstrom, 2003). In contrast, while a high proportion of the participants in our study reported mildly increased trait anxiety (57%), only 15% reported moderate to severe trait anxiety (≥ 2 SD above norms). This may be due to the less severe nature of the injuries in our population, resulting in generally lower levels of physical and cognitive symptoms of general anxiety.

In contrast to the low rates of generalized anxiety, we found much higher reported rates of moderate to severe recovery-related anxiety. Approximately 68% of respondents reported higher than average state anxiety (anxiety since the time of injury) while 58% of participants reported higher than average pain anxiety. Of those, 29% reported moderate to severe pain anxiety (≥ 2 SD above norms) and 26% reported moderate to severe state anxiety (≥ 2 SD above norms). In addition, approximately 25% of participants reported a “moderate” amount of worry related to situational aspects of recovery specifically from an upper limb injury (RRAQ total score). These results may indicate that participants experienced, or were
willing to report, more anxiety directly related to their injury as compared to general anxiety symptoms.

Current levels of disability were also associated with the extent to which questions on the measure related anxiety specifically to the injury and recovery experience. For instance, total scores from measures of anxiety that phrased items to be specific to the upper limb injury (RRAQ and PASS-20) were significantly correlated with disability while those asking about general symptoms of anxiety (T-anxiety and S-anxiety) were not. These results are in keeping with studies that have demonstrated a correlation between pain anxiety and disability (Hadjistavropoulos, Asmundson, & Kowalyk, 2004; Ring, et al., 2006). However, our results are unique in that they indicate differences in the strength of correlations between disability and specific types of anxiety. In particular, current disability was most strongly associated with anxiety directly related to the recovery experience with weaker or non-significant associations with types of anxiety less directly related to the injury/recovery.

These associations between contextual anxiety and disability are reflective of the increased recognition that both personal and environmental (or contextual) factors make to the experience of disability. For instance, the World Health Organization’s International Classification of Functioning, Disability and Health positions “disability” as an individual experience that may include impact on bodily functions, restrictions in activities, and general disruption to participation in valued roles (World Health Organization, 2002). Within this model of disability, each of these areas may be influenced by (and may influence) both personal and environmental or contextual factors. When the context of their injury is ignored in questions about anxiety, some individuals may find it difficult to relate their anxiety to bodily sensations (e.g. racing heart) or activity limitations (e.g. avoiding activities which cause pain).

With this in mind, the measures of anxiety used in this study may be ordered based upon the proposed emphasis that each of the measures places on contextual factors (defined in this case as the recovery from a traumatic upper limb injury):
1. RRAQ: specifically related to the experiences of recovering from an upper limb injury (activity limitations and participation in roles) that have been identified by others as distressing (Gustafsson, et al., 2000)
2. Pain anxiety: context is implicit (i.e. pain from injury)
3. State anxiety: adds a vague context (time since injury)
4. Trait anxiety: focus on impact on bodily functions and activity limitations (no context)

Interestingly, this ordering is in keeping with the prevalence and the strength of association with disability of each of these types of anxiety within our study population, recovery-related anxiety measured by the RRAQ being most prevalent and the most highly correlated with disability. These results may be useful in explaining the high rates of variability found in disability following upper limb injuries. In the current study, worry about specific aspects of recovery alone accounted for 19% of the variability in disability scores. None of the other anxiety types measured in this study accounted for any percentage of the variability on an individual basis. This suggests that while anxiety in general plays an important role in the wide variation we see in reported disability, recovery-related anxiety may be even more important.

This study should be interpreted within its limitations. The RRAQ was developed specifically for this study and the data provide initial face and content validity for this tool. Further validation and reliability studies are now required to examine issues such as the scale’s responsiveness to change (e.g., following successful surgery). This study is limited to the study of those with minor to moderate traumatic upper limb injuries; there is a very well-established body of literature which examines many of the same issues in those with arm pain due to non-traumatic causes (Alizadehkhaiyat, Fisher, Kemp, & Frostick, 2007; Coons, et al., 2004; Hadjistavropoulos, et al., 2004; Helliwell, Mumford, Smeathers, & Wright, 1992; Hill, Dziedzic, Thomas, Baker, & Croft, 2007; Hobby, Venkatesh, & Motkur, 2005; Niekel, et al., 2009; Ring, et al., 2006; Ring, Kadieltski, Malhotra, Lee, & Jupiter, 2005; Vranceanu, Barsky, & Ring, 2009; Vranceanu, Jupiter, Mudgal, & Ring, 2010; Vranceanu, Ring, et al., 2008; Vranceanu, Safren, Zhao, Cowan, & Ring, 2008). Studies of the validity of the RRAQ in such conditions or in those with
severe injury may be useful and would allow comparisons of the recovery-related anxiety induced by different types of injury.

In addition, the utility of the RRAQ as a scale versus a screening tool should be examined further. For instance, levels of worry on individual items of the RRAQ are perhaps even more relevant to reported disability than total score; an individual might report no worry related to difficulty with daily tasks while reporting “extreme bother or worry” about uncertainty related to future function of the hand/arm. As Gustafsson et al. (2000) point out, “to be able to give adequate support to a patient in a stressful illness situation, it is important to know what causes stress in each particular situation” (p.1334). In this study, 70% of participants reported “quite a bit” or “extreme” worry in relation to specific aspects of recovery on one or more item of the RRAQ. Gathering this information could be useful to clinicians treating individuals with upper limb injuries as it would allow them to provide immediate input to the appropriate case manager, employer, family member or other healthcare provider in order to address the issue.

As is the case in most of the studies in this research area, this study did not use a formal classification for severity of injury (Bear-Lehman & Poole, 2011; Cheung, et al., 2003; Grunert, Devine, et al., 1988a, 1988b; Grunert, et al., 1992; Grunert, Smith, et al., 1988; Gustafsson & Ahlstrom, 2004, 2006; Gustafsson, et al., 2003; Gustafsson, et al., 2000; Jaquet, et al., 2002; Jaquet, et al., 2005; Keogh, et al., 2009; Ring, et al., 2006; Williams, et al., 2009). Instead, the designation of “mild to moderate” injuries that is used to describe the nature of the injuries of most participants in this study is based upon a summary analysis of the information regarding injury collected with participant demographics in this study. This information included category of injury (i.e. wrist sprain, forearm fracture, finger fracture, etc.), requirement for surgical intervention (yes or no), and number of days spent inpatient following injury. This information was then compared with the injuries described in similar research studies. Results suggest that the injuries sustained by the sample in this study were less severe in nature than those reported in similar studies. For instance, 65.5% of our sample reported a forearm fracture, finger fracture, wrist or finger sprain as their primary diagnosis.
Uncomplicated injuries of this nature are classified as minor to moderate injuries by a version of the most commonly used upper limb injury severity rating scale, the Hand Injury Severity Scale (HISS) (Campbell & Kay, 1996) that has been modified to include injuries proximal to the wrist (the M-HISS) (Urso-Baiarda, et al., 2008). In contrast to this, many of the studies evaluating psychological distress cited in this paper are focused on those with injuries that would be classified as severe or major on this scale (Grunert, Devine, et al., 1988a, 1988b; Grunert, et al., 1992; Grunert, Smith, et al., 1988; Jaquet, et al., 2002; Jaquet, et al., 2005). In addition, only 51% of participants of this study were admitted to hospital for their injuries while several of the studies cited in this paper report results for samples in which 100% of participants were admitted to hospital for inpatient care following injury (Grunert, Devine, et al., 1988a; Grunert, et al., 1992; Grunert, Smith, et al., 1988; Gummesson, Atroshi, & Ekdahl, 2003; Gustafsson & Ahlstrom, 2004; Gustafsson, et al., 2000; Jaquet, et al., 2002; Jaquet, et al., 2005), indicating a greater potential for serious injury. Although these comparisons provide a general indication of the severity of injuries included in this study, the conclusions of this study would be strengthened by a more specific indicator of the severity of injury incurred by participants, such as the Modified Hand Index Severity Score (Urso-Baiarda, et al., 2008) and should be considered in future work.

Finally, the sample for this study was relatively small and different geographic regions or clinics may provide different responses to the areas of anxiety proposed by the RRAQ. The response rate of 51% may also have introduced some bias as, for example, those who did not respond may have had more anxiety or worse disability. However, the distribution of scores on all measures appears to be distributed normally. It is also possible that the fixed order of the measures in the questionnaires introduced some bias; it might be beneficial to vary the order of these measures in future studies.

This study provides preliminary evidence that anxiety related directly to the recovery experience may be common in those with minor to moderate traumatic upper limb injuries and that it may influence disability. Our intention is not to suggest that symptoms of anxiety disorders are an unimportant indicator of distress and outcomes in those with more severe injuries. Indeed, strong evidence
has shown that symptoms of GAD and PTSD may play an important role in the development of disability and pain (Grunert, et al., 1992; Jaquet, et al., 2002; Niekel, et al., 2009; Vranceanu, et al., 2011). However, this study indicates that there are other forms of recovery-related anxiety that play a role in disability among those with less severe upper limb injuries.

5.3 Chapter Summary
This chapter presented the results of Study I in the form of an article published in a peer-reviewed journal. These results indicate that anxiety is common following mild to moderate upper limb injuries and that this anxiety may have an influence on the degree of disability experienced following these injuries. This work completes Phase 1 of my research. In the following chapter, I explain why the results of this study caused me to question how well the concept of anxiety matched my initial set of criteria for the type of emotional reaction I was interested in studying (see Chapter 4). Phase 2 of this thesis explores how these criteria are presented in the concept of psychological distress and provides some development of psychological distress as an independent concept (See Chapters 6-10).
Chapter 6

Development of Theoretical Perspectives for Phase 2

6.1 Chapter Overview

In this chapter I discuss the shift in focus from anxiety in Phase 1 of this thesis to stress and, ultimately, to psychological distress in Phase 2 and I justify this change. I begin with a review of the rationale for my initial focus on recovery-related anxiety in Study I and how one component of this, post-injury anxiety, appeared to most closely resemble my concept of interest. Next, I describe the essential role of context in the measurement of post-injury anxiety, propose that post-injury anxiety is distinct from the other forms of recovery-related anxiety measured in Study I, and describe why I came to decide that stress may be a more accurate descriptor than anxiety for post-injury anxiety. I then introduce stress as an alternative conceptual basis for post-injury anxiety and I situate stress within the theory of stress and coping proposed by Lazarus and Folkman. Finally, I describe how the term psychological distress is related to the concept of stress as described by Lazarus and Folkman and why psychological distress ultimately appears to be the most appropriate term for the emotional reaction to traumatic upper limb injury I had observed in my patients and was interested in exploring. I finish this chapter by explaining how I planned to develop the concept of psychological distress following upper limb injury (post-injury anxiety) in Phase 2 of this thesis.

6.2 Review of initial focus: Recovery-related anxiety

My initial research interest stemmed from conversations I had as a clinician with my patients about their emotional reactions to upper limb injuries and the recovery process. From a clinical standpoint, I was particularly interested in how these reactions might relate to the experience of disability during recovery from traumatic upper limb injuries. In Chapter 4, I identified a preliminary concept called recovery-related anxiety to describe this emotional reaction, and created a set of criteria that encapsulated this emotional reaction. An important criterion
was that the emotion experienced by these individuals was specific to the context of recovering from an upper limb injury, thus differentiating recovery-related anxiety from more general forms of anxiety. As I was unable to find a single conceptualization of anxiety that met all my criteria, I measured three forms of recovery-related anxiety that included some contextual component: state anxiety, pain anxiety and post-injury anxiety (see Chapters 4 & 5). I also measured a form of general anxiety as a comparison measure.

6.2.1 Conceptual link between context and anxiety

The results of Study I affirmed that evaluating context-specific forms of anxiety was important in establishing a relationship between disability and anxiety following upper limb injuries. The strength of the relationship between the forms of anxiety measured in Study I and disability varied depending on how explicitly the tool used to measure each anxiety concept linked the symptoms of anxiety to a specific stressor (in this case, to the upper limb injury and the recovery process). For instance, generalized anxiety was measured using the State & Trait Anxiety Inventory (STAI-Y) (Spielberger, 1983). The trait (generalized) anxiety scale on this tool asks respondents to report how they generally feel in relation to such statements as “I worry too much over something that doesn’t really matter” or “I am happy,” which provides no link between the anxiety symptoms and traumatic upper limb injury. The distribution of trait anxiety was normal in the Study I sample (see Chapter 5), but it was not correlated with disability and did not appear to represent the type of emotional reaction I wanted to explore.

In contrast, two of the 3 forms of recovery-related anxiety (which were measured using tools that included aspects of the recovery experience within the questionnaire items) in Study I were correlated with disability. Correlation strength varied depending on how explicitly the link between anxiety symptoms and context was presented in the questionnaire items. State anxiety was measured by the state anxiety scale from the STAI-Y (Spielberger, 1983). Respondents were asked to reflect on statements that were nearly identical to the trait anxiety scale of the STAI-Y (i.e. “I feel upset” or “I feel tense”) but to consider their responses to reflect their emotional state only within the timeframe since their injury occurred. While this allows at least a temporal connection between perceived anxiety
symptoms and the upper limb injury, it does not directly link anxiety to the context of sustaining and recovering from an upper limb injury, thereby providing only a weak these symptoms and context. The lack of correlation between disability and state anxiety in Study I suggests that linking anxiety symptoms to the injury experience exclusively by timeframe does not provide sufficient connection for respondents to link their emotional reactions to injury (i.e. symptoms of anxiety) with the practical difficulties they are encountering due to their injuries.

In contrast, the tools used to measure both pain anxiety and post-injury anxiety link symptoms of anxiety directly to the specific context of injury recovery. Pain anxiety was measured using the Pain Anxiety Symptoms Scale (PASS-20)(McCracken & Dhir, 2002). Instructions for the PASS-20 direct respondents to consider anxiety-related thoughts, behaviours and feelings associated with one aspect of recovery from a traumatic injury – pain (McCracken & Dhir, 2002). Statements such as “I can’t think straight when in pain,” encourage respondents to consider their anxiety symptoms as a response to what, for most of them, would be an integral aspect of the recovery process. This places those thoughts or feelings in direct relationship to their upper limb injury rather than asking respondents to consider isolated anxiety or worry symptoms with no context for their cause. The relationship between pain anxiety and disability was strong, but with the limitation that pain is only one factor that might provoke anxiety related to the injury and recovery. This concept was not sufficiently broad to capture other sources of recovery-related anxiety.

The strength of the relationship between disability and anxiety was strongest in Study I for post-injury anxiety (see Table 6.1). Post-injury anxiety was measured using the Recovery-Related Anxiety Questionnaire (RRAQ), which I developed specifically for Study I. As opposed to the PASS-20, which is limited to one aspect of recovery, the RRAQ associates anxiety directly with a broad range of sources of

1 Because I developed the RRAQ based upon clinical observations and previous research explicating specific stressors following traumatic hand injuries (See Chapters 4 & 5), these clinical observations serve to provide preliminary face validity for the concept of post-injury anxiety.
distress related to recovery from an upper limb injury. For instance, respondents are asked to associate symptoms of anxiety with potential sources of distress such as “dependence on others” and “inability to play sport/instrument” (see Chapters 4 and 5).

Table 6.1: Correlations between anxiety and disability in Study I

<table>
<thead>
<tr>
<th></th>
<th>Disability¹</th>
<th>S-Anxiety</th>
<th>T-Anxiety</th>
<th>Pain Anxiety</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Anxiety²</td>
<td>.173</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trait Anxiety³</td>
<td>.186</td>
<td>.748**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain Anxiety⁴</td>
<td>.354**</td>
<td>.533**</td>
<td>.582**</td>
<td></td>
</tr>
<tr>
<td>Post-injury Anxiety</td>
<td>.446**</td>
<td>.518**</td>
<td>.456**</td>
<td>.576**</td>
</tr>
</tbody>
</table>

** = Significant at .001 level (2-tailed)

It is possible that the moderate correlations between post-injury anxiety and disability might be due in part to parallels between the RRAQ and the measure of disability included in Study I (QuickDASH) (Hudak, et al., 1996). Because the QuickDASH and the RRAQ were both designed to be used with individuals who had sustained upper limb injuries, the context of both questionnaires is similar. For instance, both questionnaires ask respondents about pain, ability to complete functional tasks, and ability to participate in sports. However, these issues comprise only 3 of 11 items on the RRAQ and 7 of 11 on the QuickDASH, suggesting that content of the two is largely distinct. In addition, while the QuickDASH asks respondents to report how much functional difficulty they have with these aspects of recovery, the RRAQ requests respondents to consider how much anxiety they cause. While further psychometric testing beyond this thesis could elucidate the relationship between the RRAQ and the QuickDASH, the strong relationship between post-injury anxiety and disability in Study I suggested that associating anxiety symptoms with specific aspects injury recovery might provide insight into the relationship between anxiety and disability that is not revealed by other recovery-related anxiety measures.

The moderate correlation between post-injury anxiety and disability implied that post-injury anxiety was the most relevant form of recovery-related anxiety to pursue in Phase 2. This impression was strengthened through psychometric testing of the construct validity of the RRAQ undertaken in Study I which
suggested that, despite some conceptual overlap, the three types of recovery-related anxiety (pain anxiety, state anxiety, and post-injury anxiety) and trait (generalised) anxiety were in fact four distinct concepts. The three forms of recovery-related anxiety demonstrated moderate to strong positive correlations (Haywood, 2007) with each other and with trait (generalised) anxiety (See Table 6.1). These correlations were expected based upon the theoretical overlap between the three forms of recovery-related anxiety.

However, further statistical analysis suggested that the 4 types of anxiety measured in Study I played discrete roles in the relationship between anxiety and disability. A multivariate analysis, designed to determine how much variability in disability scores the four forms of anxiety (including generalized anxiety) could explain when taken together as a group, was also included in Study I. Multicollinearity values calculated as part of the multivariate analysis indicated that the individual anxiety types each contributed unique data to the model, suggesting that they were 4 distinct concepts. Low variance inflation factor (VIF) values for each of the items support this assertion (See Table 6.2).

**Table 6.2: Collinearity statistics for four types of anxiety in Study I**

<table>
<thead>
<tr>
<th></th>
<th>Tolerance</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>State anxiety</td>
<td>.373</td>
<td>2.697</td>
</tr>
<tr>
<td>Trait anxiety</td>
<td>.352</td>
<td>2.842</td>
</tr>
<tr>
<td>Pain anxiety</td>
<td>.506</td>
<td>1.976</td>
</tr>
<tr>
<td>Post-injury anxiety</td>
<td>.601</td>
<td>1.665</td>
</tr>
</tbody>
</table>

This distinction was reinforced by the finding that post-injury anxiety was the only form of anxiety that explained a proportion of between-subjects variability in disability on its own (see Chapter 5). Taken together, these results suggest that, while post-injury anxiety shares some characteristics with state anxiety, pain
anxiety and trait anxiety, all four forms of anxiety represent unique concepts and each makes an independent contribution to disability.

The unique contribution that post-injury anxiety made to the results of Study I both conceptually and statistically suggested to me that post-injury anxiety was the form of anxiety most relevant to the type of emotional response to injury I was interested in. However, the research process, the Study I findings described above, and the intellectual endeavor of trying to articulate the underlying concept of the RRAQ (post-injury anxiety) left me in doubt that anxiety best described the context-specific emotional reaction measured in the RRAQ. Stated another way, if context was the most important determining aspect of disability-related anxiety within this study population, was post-injury anxiety actually a form of anxiety? Or would it be more accurate to characterize post-injury anxiety as a reaction to specific stressors within the experience of recovering from a traumatic upper limb injury, something more akin to stress?

6.3 What is post-injury anxiety?

The questions posed at the end of Study I compelled me to explore the fit of post-injury anxiety as a concept within the broader categories of anxiety and stress in more detail. When applied to a healthcare setting, these explorations eventually led me to the concept of psychological distress.

6.3.1 Why is post-injury anxiety not a context-specific anxiety?

Chapter 3 reviews the forms of pathological and non-pathological anxiety most relevant to this thesis. My initial assumption was that post-injury anxiety was a form of context-specific anxiety. Context specific anxiety, as defined in this thesis, is any form of anxiety in which the source of anxiety is related to a specific object, event or situation. Within the anxiety disorders listed in the DSM-IV, there are a number of pathological context-specific anxieties including the specific phobias (e.g. agoraphobia), post-traumatic stress disorder, and acute stress disorder (both of which are a response to a specific event). Despite their emphasis on context, the forms of context-specific anxiety described in the DSM-IV did not match the criteria for the type of emotional reaction I was interested in exploring due to their pathological nature.
However, there are also a number of non-pathological forms of context-specific anxiety in the psychology literature. Some of the more commonly studied non-pathological context-specific anxieties are test anxiety (Mandler & Sarason, 1953; Sarason & Mandler, 1952), musical performance anxiety or stage fright (McGinnis & Milling, 2005; Salmon, 1990) and, pain anxiety (Asmundson, Hadjistavropoulos, Bernstein, & Zvolensky, 2009; Asmundson, Norton, & Norton, 1999; Gheldof, et al., 2006). Each of these forms of non-pathological, context specific anxiety is characterised by symptoms of anxiety that occur within a specific situation (e.g. the sitting of an exam) or in relation to a specific stressor (e.g. pain). While associations may be present between these forms of non-pathological anxiety and anxiety disorders (i.e. between social phobia and stage fright) (Osborne & Franklin, 2002), these forms of anxiety are generally described as emotional reactions that may occur in most people along a continuum of severity with some people presenting mild symptoms and other exhibiting more severe symptoms (Osborne & Franklin, 2002).

Conceptually, post-injury anxiety appears to fit well within this group of non-pathological, context-specific anxieties for four reasons. First, like the other forms of non-pathological, context-specific anxiety, post-injury anxiety is a non-pathological response to a specific situation (upper limb injury). Second, post-injury anxiety may include symptoms of anxiety, such as worry or fear, that are common to all forms of anxiety, including context-specific anxiety. Third, similar to other forms of non-pathological context-specific anxiety, there are a number of aspects of traumatic upper limb injuries that one would expect most people to respond to with some anxiety including pain, disruption to activity and routine, and possible surgical intervention or casting. However, my experiences as a hand therapist suggested that the degree to which people experience anxiety related to these issues varies widely. The presentation of symptoms of post-injury anxiety along a continuum is in keeping with other forms of non-specific anxiety. These four similarities between context-specific anxiety and the emotional reaction to injury I saw in my patients attributed to my initial selection of the concept of anxiety as my concept of interest.
However, despite the initial ‘good fit,’ two key differences between non-pathological, context-specific forms of anxiety and the emotional response to injury that I was attempting to study became apparent. First, although context-specific anxiety is considered within a specific context (e.g. a test, a stage performance, or in relation to pain), the conceptual focus presented in the research on context-specific anxiety and in the tools used to measure it is on the symptoms of anxiety rather than on the interaction between the context and the individual (McCracken & Dhingra, 2002; McGinnis & Milling, 2005). For instance, the Pain Anxiety Symptoms Scale (PASS-20), which measures pain anxiety, asks patients to comment on their cognitive, behavioural, physiological and fear symptoms relating to pain (McCracken & Dhingra, 2002). However, it does not ask patients to relate their anxiety symptoms to a specific painful injury or experience. As such, the tool is measuring anxiety related to an individual’s broad conception of pain and painful stimuli rather than relating anxiety symptoms to a specific event or context. In contrast, my interest in post-injury anxiety is how individuals perceive their emotions as relating to their experience of recovering from a specific upper limb injury rather than from injury or illness in general. In other words, context-specific anxiety tends to focus on a broad context while post-injury anxiety is related to a very narrow context.

Secondly, context-specific forms of anxiety tend to be stimulated by present or future events whereas post-injury anxiety is a response to a past event. For example, performance anxiety is triggered by performing in front of others or by anticipating negative reactions from such a performance (McGinnis & Milling, 2005). In contrast, post-injury anxiety is triggered by an event that has occurred in the past. Both forms anxiety may include contain elements of worry (which could be construed as future-oriented) and bother (which is more related to current irritations). However, performance anxiety occurs due to of an event that may or may not have happened yet while post-injury anxiety is a reaction to actual stressors from an event that has already occurred. While this may appear to be a trivial distinction, this point highlights my criteria that the emotional reaction I was interested in studying and had observed in my patients in the clinic was
reactionary rather than anticipatory. As such, context-specific anxiety does not match this criterion.

Considering that context-specific anxiety is focused on a broad context and that it is not reactionary in nature, I concluded that context-specific anxiety was not an adequate conceptual match with post-injury anxiety. At this point, I began to question whether anxiety as a general category or emotional responses was an adequate fit for post-injury anxiety and decided to expand my exploration to the related concept of stress.

6.3.2 Could post-injury anxiety be a form of stress?

I found myself drawn to the concept of stress for two reasons. First, stress is consistently characterised in popular media as a physiological or emotional reaction to an event or a change (Livestrong, 2015; Medline Plus, 2015; WebMD, 2015). This matches well with my original criteria that the emotional response I was interested in was a reaction to injury, not an underlying tendency to respond to situations in general with increased anxiety. This distinction is reflected in the way questions are phrased on research tools designed to measure anxiety and stress. For instance, the Hospital Anxiety and Depression Scale (HADS), which measures depression and anxiety, asks respondents to report how often “I get a sort of frightened feeling as if something awful is about to happen” (Zigmond & Snaith, 1983). Although participants may naturally associate these feelings with an experience they are currently engaged in (e.g. recovery from an upper limb injury), it is not possible to determine if their response is specific to this experience or is related to some other event. In contrast, the Impact of Event Scale (IES), which measures stress, asks respondents to consider how often “Any reminder brought back feelings about it” (Horowitz, Wilner, & Alvarez, 1979). While both questions require respondents to consider feelings, the measure of stress (IES) asks the respondent to consider these feelings within the context of a specific situation while the measure of anxiety (HADS) asks for a general feeling without reference to a cause or stressor. The direct correlation between emotions and a specific stressor suggested that stress might be a good fit with my concept of interest.
Second, the popular associations of stress are quite different. Despite assertions by health websites that anxiety is a normal and common human emotion (American Psychological Association, 2014), anxiety is often closely associated with mental disorders or problems. For instance, in an article entitled “What is Anxiety?” the Medical News Today site states that anxiety is a “general state of worry and fear... that is easily justified and considered normal” (Medical News Today, 2015). However, this statement is several sentences below the opening statement, which describes anxiety as “a general term for several disorders that cause nervousness, fear, apprehension and worrying” (Medical News Today, 2015). In contrast, stress is normalised as an “omnipresent part of life” (Psychology Today, 2014). These undertones have an impact on the way in which my patients responded to questions about these concepts in the clinic. From personal experience, I found that my patients were much more willing to talk about stress or bother related to their injury and recovery than they were about anxiety or worry. Applying this finding to research, the concept of stress as a general label for post-injury anxiety appears to demonstrate good face validity, or acceptability with patients as a label for their emotional response to injury. Stress also exhibits stronger face validity to me as the researcher due to its strong link between the event or context and the resulting emotional reaction. Considering the strong conceptual link between stress and my concept of interest, I decided to explore the concept of stress within the research literature further to determine if stress was a better fit for my criteria than anxiety.

6.4 What is stress?

The term stress has been used in fields as diverse as physics, sociology, and physiology. As a result, definitions of the concept of stress have also varied considerably from field to field. Initially popularized by a British physicist, Robert Hooke, in the seventeenth century in relation to the physical environment, stress was used to describe the internal force created by the ratio between a load (or external force) and the surface area upon which that load acted. In this context, stress was described in contrast to strain, which referred to the degree of deformation or distortion of an object under high stress. In more modern times, the definitions of stress have often followed a stimulus-response model, with the
emphasis of research either on stress as a stimulus or stress as a response (Lazarus & Folkman, 1983).

Early applications of the term stress to human emotion focused on defining stress as a physiological reaction or response to a stimulus. Many of the early stress researchers focused on the response portion of this equation. For instance, Walter Cannon, who is credited as being the first to argue that stress could be measured as a physiological phenomenon, described stress as a disturbance of homeostasis within the body (Cannon, 1926; Cannon, 1935). This definition of stress focuses on the response of the body to a stressor with little attention to what actually causes the stress (the stimulus). Hans Seyle furthered this depiction by describing stress as a dynamic set of bodily defenses to environmental demands (stressors), a process he called the General Adaptation Syndrome (Seyle, 1956). Seyle was also responsible for the assertion that stress could be either positive (eustress) or negative (distress) in nature (Seyle, 1976). Stress and, in particular, distress, have found their way into the popular vernacular today and are widely used in both research and popular literature. While physiological, research-based definitions have provided a wealth of information about the body’s response to noxious stimuli, they provide limited information about the sources of stress.

In contrast to the response definitions of stress popularized by early research, Lazarus argues that stress research within psychology may be described as stimulus definitions, implying that this research has historically focused on identifying the stimulus that evokes a stress response rather than on the response of the individual to the stimulus (Lazarus & Folkman, 1984). Stimuli known to evoke a stress response may be environmental (such as an earthquake, a war, or a divorce) or a condition arising within the person (referred to as a drive stimuli such as hunger or sex) (Lazarus & Folkman, 1984). There are limitations to this approach as well. One of the disadvantages of the stimulus-response definitions in psychology research is their focus on extreme stressful situations, which tends to limit the ability to evaluate individual differences in stress reactions (Lazarus & Folkman, 1984). For instance, most people would respond to a situation like living in a war zone with stress, making it difficult to identify and evaluate differences between those who do respond with stress and those who do not. However, the
variability in stress responses grows as one starts to look at more ambiguous, milder and more frequent life-stressors (Lazarus & Folkman, 1984). Everyday aspects of life that may be stressful for one person at a given point in time are not stressful for another person or at a different point in time. This argument has direct implications for the research related to upper limb injuries. While extreme injuries such as amputations or crush injuries might result in stress for most people, the milder injuries seen in a typical hand therapy clinic may create stress for some and not for others.

In contrast to the focus on environmental stimuli in psychology stress research, early work related to psychosomatic sources of illness focused on characteristics inherent in individuals as stimuli for illness or disease (which could be described as the response). For instance, a number of researchers have attempted to define person-oriented stress syndromes such as the ulcer personality (Roth, 1955). However, the failure of these researchers to come up with a stable list of personality criteria which explained these illnesses suggests that the relationship between stress and illness is much more complex than a simple stimulus-response relationship could explain. More modern research on immunology and health has focused on the role that stress plays in contributing to vulnerability to disease rather than attempting to find a causal link between health and stress (Lazarus & Folkman, 1984). This more modern view of the relationship between stress and illness as a complex combination of factors may be applied to the relationship between stress and recovery from traumatic injury in this thesis. In particular, the role of stress in contributing to the vulnerability of an individual to experience greater levels of disability is relevant.

Most modern theories take a relational approach to defining stress. In contrast to the stimulus-response definitions, which focus on either the stimulus or the response, relational definitions of stress focus on the complex relationship between the stressor (or context) and the individual in determining whether or not someone will experience stress in a given situation (Lazarus & Folkman, 1984). The focus on the relationship between context and emotional response within these definitions of stress led me to conclude that stress (as defined within a relational definition) was more relevant to the form of emotional response I was
interested in exploring than anxiety (which was defined largely by emotional or behavioural symptoms exhibit by an individual). I will return to this following a description of one of these relational theories of stress by Lazarus and Folkman.

6.4.1 Lazarus and Folkman’s theory of stress, appraisal, and coping

Lazarus and Folkman’s theory of stress (1984) is one example of a relational approach to stress. This theory expands the simple stimulus-response definitions of stress by focusing on the influence of cognitive appraisal in the creation of stress. Cognitive appraisal theory has roots in the phenomenological tradition in psychology and asserts that the meaning ascribed to an event shapes one’s emotional and behavioural response. Within Lazarus & Folkman’s (1984) theory, cognitive appraisal serves as a mediator between the context in which stress occurs and the characteristics of the person:

“Psychological stress is a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being” (p. 19).

Within this definition of stress, the complexities surrounding the generation of stress are recognised by the inclusion of both the cognitive appraisal process and the availability of resources in mediating stress.

The process of appraisal involves a reaction to an encounter with the environment and may be conceptualized in two steps: primary appraisal and secondary appraisal (although these steps do not necessarily occur in sequence nor is one step more important than the other). Lazarus & Folkman also talk about a reappraisal, which refers to modifications to the initial appraisal of the event based upon new information from the person or the environment (Lazarus & Folkman, 1984). Primary appraisal is a determination of the personal significance of an event and how it will influence one’s well being. Encounters may be categorized in one of three ways (Lazarus & Folkman, 1984):

- **Irrelevant**: has no implication for a person’s well-being
- **Benign-positive**: preserves or enhances well-being or promises to do so (leads to joy, love, exhilaration, etc)
• *Stressful:* includes harm/loss, threat, and challenge

Those events that are appraised as stressful may be further categorized as follows:

• *Harm/loss:* some damage to person already sustained (e.g. illness, loss of loved or valued person, acknowledgement of some damage self-esteem)

• *Threat:* anticipated harms or losses
  - Characterised by negative emotions such as fear, anxiety, anger

• *Challenge:* potential for gain or growth
  - Characterised by positive emotions such as eagerness, excitement
  - Can be threatening and challenging
  - Involves some sense of control over situation

These categories are not considered mutually exclusive. An event that is considered to include harm or loss will always include some measure of threat due to the negative implications for the future. For instance, a severe injury also carries with it the anticipation of further surgery or difficulty with future functioning. This anticipation of future threats has implications for future coping mechanisms, which allow the individual to plan for some of the issues in advance (i.e. anticipatory grief). Similarly, threat and challenge often coexist in response to one situation and the relationship between these two appraisals may change over time.

The determination of whether or not an individual will appraise a situation as stressful is influenced by both environmental and personal factors (Lazarus & Folkman, 1984). Situation (or environment) factors are the properties of a situation or event that contribute to an individual’s appraisal of a situation as irrelevant, benign, or stressful. These factors are comprised of the formal properties of an event rather than what a situation is actually about (e.g. whether the situation includes violence or injury) (Lazarus & Folkman, 1984). Formal properties are the intangible aspects of a situation such as whether the person has encountered a similar situation before, how predictable the outcome of the situation is, and temporal issues such as the duration of the event (see Figure 6.1).
Figure 6.1: The relationship between person factors, situation factors, and resources in appraisal (adapted from Lazarus and Folkman, 1984)

Lazarus & Folkman take care to point out that they do not believe that situations are inherently stressful. However, they argue that certain formal properties of a situation may tend to make a particular situation stressful for more people (Lazarus & Folkman, 1984). Therefore, identification of formal properties within a situation is important in understanding stress that occurs in relation to that situation.

Person factors are characteristics inherent to the individual. These factors influence appraisal by: 1) helping the person to determine how the encounter influences well-being, 2) shaping the person’s understanding of the encounter, and 3) establishing a baseline for understanding the outcomes of the encounter (Lazarus & Folkman, 1984). Although these characteristics are considered separately from environmental factors, they are interdependent with environmental factors. Person factors that influence appraisal include commitments and beliefs (See Figure 6.1). Commitments, as defined by Lazarus, are the things that are important to the person and help to determine what is at stake in a particular situation for an individual (Lazarus & Folkman, 1984). For
instance, if maintaining independence is something that is highly valued, a situation that results in a loss of independence will be appraised as stressful. Beliefs encompass pre-existing notions about the world and social constructs that colour the way in which the person views reality (Lazarus & Folkman, 1984). For instance, beliefs about personal control over a situation in general or over one’s response to the situation are likely to have an influence on the appraisal of a situation as degree to which the situation is seen as challenging instead of threatening. Due to their role in determining stress, having an understanding of an individual’s beliefs and commitments is imperative in predicting whether a situation will be interpreted as stressful for that individual.

Secondary appraisal involves an evaluation of what can be done about the situation. In particular, secondary appraisal focuses on determining what coping options are available and what the likelihood is that one of the available coping options will accomplish what it is intended to. Secondary appraisal also includes an evaluation of the possible consequences of employing a particular coping strategy, such as avoidance, within the context of the situation. This appraisal of potential coping strategies interacts with the primary appraisal of what is at stake to determine the degree of stress created by a particular situation. For instance, if a person determines that a situation is threatening to a fundamental belief but is unable to identify an effective way to cope with the situation, stress levels will be high. On the other hand, if the person feels adequately equipped to handle the situation through his/her resources and coping strategies, he or she might appraise the situation as a challenge rather than a threat.

Secondary appraisal is influenced by the resources that an individual has available to them. Although Lazarus and Folkman do not purport to describe an exhaustive list of potential resources, they discuss several important resources including:

- Health and energy
- Positive beliefs
- Problem-solving skills
- Social skills
• Social support
• Material resources

Each of these resources contributes to an individual’s appraisal of a situation as threatening or not threatening and how well he or she will be able to cope with it. Lazarus and Folkman do not describe specific coping strategies within their theory. Instead, they focus on coping as a dynamic interaction between an individual’s appraisal of a situation, available resources, and coping strategies. As coping was beyond the scope of this thesis, I do not go into further detail on coping in this chapter.

6.4.2 Why is stress a better fit than anxiety?

The emphasis on the dependent nature between personal and situational factors in the relational definitions of stress reinforced my conviction that what I initially labeled post-injury anxiety more closely resembled the concept of stress than the concept of anxiety. In particular, Lazarus and Folkman’s (1984) theory of stress specifically addressed three aspects of my concept of interest that were not addressed by definitions of anxiety. First, the interdependent relationship in Lazarus and Folkman’s model between the context of the stress and the individual in the appraisal of a situation as stressful means that it is impossible to identify stress without referring to both the individual and the context of stress. This is relevant to my first criterion, which asserted that the emotional reaction was a response to the recovery from a traumatic upper limb injury and therefore must be viewed in the context of that injury. It also reinforces the results from Study I indicating that context was an important indicator of disability. Framing this emotional reaction as stress as defined by Lazarus and Folkman allows the focus on this reaction to include reference to the context in which it occurs.

Second, the depiction of stress by Lazarus and Folkman also provides an explanation for why the severity of injury is not necessarily correlated with degree of emotional reaction. Assuming that stress is the result of an individual’s appraisal of the experience of recovering from a traumatic upper limb injury, then it is the combination of the personal characteristics of that individual and the situation that will determine how much stress a person experiences. In other words, a more
severe injury would not necessarily lead to greater levels of stress than a milder injury because stress levels would vary depending on how an individual appraised the situation and what resources he or she had to cope with the situation. This assertion is supported by studies that show that injury severity is not necessarily associated with levels of reported disability (Doornberg, et al., 2005; Lindenhovius, Buijze, Kloen, & Ring, 2008). It also matches my experiences as a clinician working with individuals with a wide range of severity of injuries in which I noted that those with the greatest levels of stress were not necessarily those with the most severe injuries.

Finally, the emphasis on the appraisal process in determining levels of stress allows this theory to take into account the fact that individuals and groups of individuals differ in their sensitivity and reaction to certain types of events. While one person might react to a particular situation with anger, another may respond to the same situation with very little emotion (Lazarus & Folkman, 1984). Therefore, although the situation factors remain unchanged, the interaction of situation factors with personal factors and resources results in two people appraising the same situation in very different ways. This is relevant to the context of upper limb injury, in which some people exhibit a high degree of stress towards their injury and recovery while others appear to complete the recovery process with very little emotional reaction.

6.5 Psychological distress: Lazarus & Folkman’s view of stress in healthcare literature

The portrayal of stress as an interactive process between situational and personal factors resonated with my attempts to describe what I had originally termed anxiety in the patients I saw in the clinic. In particular, I saw that the value placed upon context within Lazarus and Folkman’s theory fit well with the importance that context appeared to play in the results from Study I. However, in reading health literature in general and hand injury literature in particular, stress as a term is used mostly in the context of stress reactions to define symptoms of post-traumatic stress disorder or acute stress disorder (Bear-Lehman & Poole, 2011). These definitions of stress have more in common with the anxiety disorders described in the DSM-IV (or the stress disorders in DSM-5) than with Lazarus and
Folkman’s conceptualization of stress as an appraisal of a situation dependent on the relationship between an individual and a context (see Chapter 8 for a full review of the use of the term psychological distress and related terms within the literature related to traumatic upper limb injuries).

In order to find a term that more accurately described the broader context-based stress that I was interested in, I then considered the term psychological distress, which appears frequently in studies of emotional and psychological reactions to traumatic upper limb injuries (see Chapter 8). The terms stress, distress and psychological distress have been used in healthcare literature with vague and overlapping meanings. Ridner (2004) attempted to differentiate these terms within her concept analysis of psychological distress in health-related literature. Her findings suggested that psychological distress as presented in the healthcare literature appeared to closely match Lazarus and Folkman’s conceptualization of stress and the type of emotional reaction to injury that I was interested in exploring. Based upon her results, Ridner (2004) defined psychological distress as:

“The unique discomforting, emotional state experienced by an individual in response to a specific stressor or demand that results in harm, either temporary or permanent, to the person” (p. 539).

This definition depicts psychological distress as a response to a specific threat versus a general threat (which she defines as a stress response) and it emphasizes that psychological distress is an emotional state (as opposed to a pathological psychological disorder). There are some limitations to this definition in relation to Lazarus and Folkman’s broader theory. In particular, this definition appears to apply only to what Lazarus and Folkman would describe as a harm appraisal of a situation. Nevertheless, Ridner’s definition of psychological distress matches my criteria for my concept of interest as it defines psychological distress as an emotional reaction to a specific stressor and highlights the interaction between aspects of this stressor and the individual. As such, I decided to pursue the concept of psychological distress as a label for the type of emotional reaction I was interested in studying for the remainder of this thesis.
6.6 Where to from here in this thesis?

It appeared that the concept of post-injury anxiety that I had initially identified as anxiety was more accurately described by the global concept of stress defined by Lazarus and Folkman’s theory of stress and coping. However, the healthcare literature uses the term psychological distress instead of stress to refer to this concept. Moving forward from Phase 1 to Phase 2, I was interested in how psychological distress was presented in the narrow literature related to recovery from a traumatic upper limb injury and how that presentation compared to Ridner’s conceptualization of psychological distress, to Lazarus and Folkman’s theory of stress, and to the emotional reaction I had initially called post-injury anxiety. Therefore, I will present a concept analysis of psychological distress in the literature related to traumatic upper limb injury.

6.7 Chapter Summary

This chapter has described the evolution of my understanding of the terms anxiety, stress, and psychological distress and how these terms fit within the overall goals of my research. In particular, I described how my focus shifted from the concept of anxiety in Part 1 of my thesis to psychological distress in Part 2 (including Studies II and III). I have also provided a description of a theory of stress by Lazarus and Folkman upon which the remainder of my thesis will be grounded. The next two chapters describe the results of a concept analysis showing how the concept of psychological distress is presented within the literature related to traumatic upper limb injuries and how this depiction relates to Ridner’s definition of psychological distress, Lazarus and Folkman’s theory of stress, and my concept of post-injury anxiety. Specifically, Chapter 7 describes the methodological and theoretical background to concept analyses while Chapter 8 presents an Evolutionary concept analysis of psychological distress following traumatic upper limb injury.
Chapter 7

What Type of Concept Analysis?

7.1 Chapter Overview
In this chapter, I provide the background methodological information relating to Study II, an Evolutionary concept analysis of the term psychological distress as presented in the traumatic upper limb literature. I provide an overview of the method of concept analysis, define what is meant by the term concept, and describe the components of a concept. I also discuss the idea of concept maturity followed by a review of the most common forms of concept analysis and a brief discussion about the role of context within concepts. I end the chapter by describing the Evolutionary Method of concept analysis, which is the theoretical basis of the concept analysis presented in Chapter 8.

7.2 What is a concept analysis?
Many of the terms used in healthcare represent abstract and often poorly defined behaviours or ideas (Ridner, 2004). For instance, in my field of hand therapy, some clinicians implicitly associate the term psychological distress only with post-traumatic stress disorder while others have a broader understanding of the term and associate it with feelings such as bother or worry. Patients who access healthcare may have an altogether different understanding of psychological distress that has been honed by exposure to the term through media, popular culture, and direct or indirect distressing experiences (Risjord, 2009). This discord in understanding creates problems in communication and leads to confusion in both research and clinical settings.

Concept analysis is a method of theoretical exploration that is often utilised in nursing research and that seeks to refine or develop understanding of the complex behaviours or phenomena encountered by clinicians. The enhancement of
conceptual clarity provided by these studies allows for better communication about a concept, provides the building blocks for further study, and allows for theoretical manipulation of the components of the concept (Morse, Mitcham, Hupcey, & Tason, 1996). A concept analysis may take a number of different forms depending on the goals of the researcher and the purposes of the analysis. This chapter provides an overview of concepts and concept analyses.

7.3 What is a concept?

Before embarking on a discussion about concept analysis, it is important to first clarify the term concept. Concepts are commonly defined as “complex mental formations of empirical experience” (Chinn & Kramer, 2011). In other words, concepts are cognitive representations of the experiences that people have, either directly or indirectly through other people or through the media. In this definition, experiences is meant to include anything that the individual perceives: objects, other people, sounds, behavior, interactions, movement, colour, etc. These experiences are considered empiric when they can be described to others and verified through sensory input. This definition of concept incorporates the work on concepts and category formations from the fields of developmental psychology and cognitive anthropology (Morse, 1995).

Concepts may range in degree of abstraction from a fairly concrete object like a chair to more abstract phenomena like hope or self-esteem. Concrete objects are typically described based upon their physical characteristics, their use, or their meaning in context (Meleis, 2007). In contrast, abstract concepts are often made up of a number of behaviours and/or processes that exemplify the concept being defined (Meleis, 2007). For instance, a recent concept analysis of hope post-stroke found that hope consisted of an inner state, an outcome-oriented attribute, and an active process (Bright, Kayes, McCann, & McPherson, 2011). Within healthcare literature, concept analyses are generally used to help to define these more abstract concepts.
Regardless of whether or not the concept is concrete or abstract, a concept provides much more information than simply a label or a definition. To illustrate how a concept differs from a simple label, picture a *cup*. This could be a small, rounded object with or without a handle that is capable of containing liquid. However, *cup* may also be used to refer to a sporting event (e.g. the Stanley Cup in ice hockey) or, in North America, to a piece of male protective equipment used during sporting endeavors. Dictionary definitions may provide more information than a label, but they are often inadequate in clarifying more abstract terms (Morse, Mitcham, et al., 1996). For instance, a dictionary definition for *distress* is simply “suffering that affects the mind or body” (Merriam-Webster online, 2014). While this may be an accurate description of distress, this definition could legitimately refer to such disparate concepts as depression, headache, cancer or anxiety. More information than a simple definition can supply is needed to differentiate these concepts from one another. The components of a concept provide this information.

### 7.3.1 Components of a Concept

A concept can be modeled as having five interlinking features (Morse, 1996a): 1) definition and label, 2) characteristics or attributes, 3) boundaries, 4) preconditions and 5) outcomes. The following sections provide an overview of each component as described by Morse (1996a). In order to illustrate how each may be used to clarify a particular concept, I use the example of *psychological distress* from Ridner’s analysis of this concept within health-related literature (Ridner, 2004).

#### 7.3.1.1 Definition and label

A label is the word or words used to describe a concept (i.e. psychological distress). A concept should have a label that is easily recognizable and allows communication about the concept. With the more abstract and complex concepts referred to in healthcare, this label may refer to a collection of behaviours and/or
symptoms. A definition is the basic description of the concept represented by a label; it should be meaningful and provide enough information that the concept can be identified. Within Ridner’s (2004) analysis, psychological distress (the label) was defined as: “the unique, discomforting, emotional state experienced by an individual in response to a specific stressor that results in harm, either temporary or permanent, to the person” (p539). This definition clearly identifies psychological distress as an emotional state and provides a synopsis some of the characteristics, outcomes and antecedents of this concept.

7.3.1.2 Characteristics (also referred to as attributes)

The characteristics of a concept are its defining features that serve to identify and differentiate the concept from other concepts. For instance, Ridner (2004) proposed the following characteristics of psychological distress in a general nursing population:

1. Perceived inability to cope effectively
2. Change in emotional status
3. Discomfort
4. Communication of discomfort
5. Harm

Each characteristic may be present in different strengths in different situations (Morse, Mitcham, et al., 1996). However, all characteristics must be accounted for in order for an example to be considered as representing a particular concept.

7.3.1.3 Boundaries

Characteristics are also used to determine boundaries between related concepts, which may share multiple characteristics. The absence of one or more of the characteristics may alter the concept so that it becomes a related concept rather than the same concept. For instance, if all the characteristics of psychological distress described by Ridner (2004) were present except change in emotional
status, the remaining characteristics may accurately be applied to chronic anxiety rather than acute distress. If new characteristics are apparent in a situation that are not part of the identified attributes of the concept in question, the resulting collection of characteristics may also more accurately describe a related concept (Morse, Mitcham, et al., 1996).

7.3.1.4 Antecedents or preconditions

Antecedents are conditions that are required to produce the concept or generally precede the concept. They may be fairly self-explanatory and general. For instance, one of the antecedents to psychological distress described by Ridner (2004) is that there must be a “living, conscious biopsychosocial being to experience” (p. 540) distress in order for it to occur. Antecedents may also be specific to the situation.

7.3.1.5 Outcomes or consequences

Outcomes describe what happens as a result of the concept. For instance, psychological distress may result in temporary or permanent harm to the individual or it may result in personal growth (Ridner, 2004).

7.3.2 Concept Maturity

Concepts may also be evaluated for their relative maturity. Concept maturity refers to how well each component of the concept has been developed and how consistently it is used within the literature (Morse, Hupcey, Mitcham, & Lenz, 1996) (See Table 7.1). A mature concept is one with an unambiguous definition, clearly defined characteristics, well demarcated boundaries with related concepts, and identified preconditions and consequences (Morse, 1995). In addition, a mature concept is represented in a broad base of literature that clearly defines the concept and uses it consistently. An immature concept, on the other hand, may be used interchangeably with related concepts or may not be adequately defined in the literature. For instance, when a concept is immature, two or more concepts may be used to explain the phenomenon in the literature (Morse, 1995). Immature
concepts require further development to adequately define the concept or to differentiate it from a related concept.

**Table 7.1: Concept maturity**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Immature</th>
<th>Partially mature</th>
<th>Mature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition</td>
<td>Inadequate, elusive</td>
<td>Multiple definitions. Confusion with use.</td>
<td>Clear.</td>
</tr>
<tr>
<td>Application</td>
<td>May not be clearly distinguished from other concepts.</td>
<td>Used inconsistently. Fuzzy boundaries with other concepts</td>
<td>May or may not be used consistently. May be combined with others in theory.</td>
</tr>
<tr>
<td>Availability in literature</td>
<td>Concept not well represented in literature</td>
<td>Available in one or multiple disciplines</td>
<td>Literature provides clear description of concept</td>
</tr>
</tbody>
</table>

Adapted from (Morse, Hupcey, et al., 1996)(p. 269)

### 7.3.3 The debate about context and characteristics

There is some debate about the characteristics of concepts and their relationship to the context in which they occur. Theorists such as Rodgers (1989) and Risjord (2009) argue that concepts are dependent upon time, context and event. For instance, if you asked someone 30-40 years ago to describe a mouse, he or she would most likely describe a furry creature that likes to eat cheese. However, if you ask a college student today to describe a mouse, he or she may describe an electrical device that serves to control the cursor on the screen of his computer. Similarly, asking the same question while standing in a barn may evoke a different response than while standing in a computer lab. Thus, these theorists argue that the characteristics of a concept should be specific enough to reflect the setting in which it is being described. In contrast, Morse (1996a) argues that the
characteristics of a concept should be broad enough to be true for that concept regardless of the setting or discipline in which it occurs (Morse, Mitcham, et al., 1996). This debate has continued throughout the development of the methods used for concept analysis within nursing theory.

The initial applications of concept analysis in nursing emphasised the importance of context in understanding language. More specifically, concept analysis as it is known in nursing research traces its roots to the work of the “ordinary language philosophers” in the 1960s (Morse, Hupcey, et al., 1996; Risjord, 2009), who placed a strong emphasis on the context of language. According to this group, thinkers need to define what they mean by the terms they use in everyday language in order to avoid linguistic muddles (Risjord, 2009). With the aim of creating a process to clarify terms used in everyday language, therefore, Wilson produced a step-by-step process for developing a robust concept as a class project for his students (Morse, Hupcey, et al., 1996; Wilson, 1963). His process centered on the construction of a series of cases in which a word would be used and situations where it would not be used including: model case, contrary case, related case, borderline case, and invented case. Taken together, the cases illustrated the characteristics of the concept and differentiated it from related terms. In Wilson’s approach, the meaning of a concept is derived from the illustrative cases. Because the cases were used to differentiate situations in which a word was used or not used, the resulting concepts are necessarily both time and context dependent.

This emphasis on context was diminished by the work of Walker and Avant (Walker & Avant, 1988), who adapted Wilson’s methods to nursing theory by shifting the source that provides meaning to the concept from the series of cases to a broad literature review. In particular, as they intended this method to be used to develop theories about clinical concepts, they argued that the data informing the formation of the concept should be based upon a broad and inclusive literature search, taking examples of the use of a concept from medical texts and articles, colleagues, literature sources, dictionaries, thesaurus, and medical literature
(Risjord, 2009). In this method, the illustrative cases serve simply to clarify the concept rather than to provide actual meaning to the concept. Although Walker & Avant’s method is one of the most common methods of concept analysis found in the nursing literature, the techniques have been criticized by some for creating very broadly-defined concepts (Morse, 1995). In particular, detractors argue that by adding a broad literature search and effectively removing the context of a concept from its development, this method leads to concepts that are applicable to a wide range of situations but may not be specific enough to be meaningful (Risjord, 2009).

In response to the diminished attention to context found in Walker and Avant’s method, Rodgers developed the evolutionary method of concept analysis (Rodgers, 1989, 1993). Rodgers argued that the context in which a word was used was important because the meaning of a word evolves both over time and through application of the word to different settings. For instance, the word “depression” has quite a different meaning in a psychiatric ward than it does in a meteorological suite (Risjord, 2009). In keeping with this, Rodgers advocated for the development of characteristics of a concept that are applicable to the presentation of that concept within a specific time and environment (Rodgers, 1989). Rodgers’ method parallels Walker and Avant’s method in that she emphasizes that the analysis of the meaning of a concept should come from the medical literature rather than from the development of illustrative cases, such as in Wilson’s methods. However, she specifies that the concept should be explored within a particular context (such as a specific discipline or timeframe) rather than broadly explored as in Walker & Avant’s method (Rodgers, 1989). Although she advocated for the inclusion of a model case (if appropriate) for the specific analysis, she did not feel that the other cases described by Walker & Avant (such as the invented case or the contrary case) were appropriate for her method as their inclusion reflected a view of the concepts as constant, or unchanging (Knafl & Detarick, 1993).
The debate about context continues among modern theorists. One of the most prolific concept analysis theorists in modern times, Janice Morse (Morse, 1995; Morse, Hupcey, et al., 1996; Morse, Mitcham, et al., 1996), argues that it is essential to develop an understand of the characteristics of a concept from multiple sources in a wide variety of fields as some concepts may have been adopted from one discipline to another. One classic example is the concept of stress in psychology, which was borrowed from physics (see Chapter 6). As such, it is important to see how these concepts may have been altered during this transfer between disciplines. In contrast, Risjord (2009) differentiates between scientific concepts and colloquial concepts, arguing that scientific concepts are by necessity more precise than their colloquial counterparts and therefore must be understood within specific contexts. According to Risjord (2009), indiscriminately mixing literary, colloquial and scientific sources results in the development of such a diluted concept that it is impossible to justify the explication of that concept's attributes.

7.4 Methods of concept analysis

Ironically (as the purpose of concept analysis is to clarify the meaning of words), the terminology relating to concept analysis varies author by author. For instance, while some authors use the term concept analysis to refer to the general process of inquiry, others use the term to refer to a specific strategy for concept development (Morse, Hupcey, et al., 1996). In this chapter, I will use the term standard concept analysis to refer to the specific strategy and concept analysis to refer to the general process of enquiry. However, in general, strategies for concept analyses can be broken down into three major categories, including concept exploration (or development), concept clarification (or delineation) and concept analysis (Meleis, 2007). Choosing a method is based upon the maturity of the concept in question and the goals of the analysis (Weaver & Morse, 2006). In the following sections, I primarily focus on the descriptions of the categories described by Meleis (2007) in her textbook on theory development in nursing. I chose these descriptions for two
reasons: 1) because she provides clear distinctions between the different strategies, and 2) because she provides general guidelines for completing a study in each category that are easily adapted to align with one of the major theorists.

7.4.1 Concept exploration

The least common and least prescribed strategy of concept analysis is concept exploration (or concept development, as described by Morse, 1996a). This strategy may be used to introduce new concepts, such as symptom perception (Posey, 2006), into the vernacular of a discipline. It may also be used to provide a focus for a concept that has been used so extensively within a particular discipline that its meaning is taken for granted despite the relative immaturity of the concept within the related literature (Meleis, 2007). For example, a label may be borrowed from another discipline or incorporated into clinical language from common usage without attention to the history or use of the concept. In either of these situations, a researcher may identify a collection of behaviors, symptoms, and/or emotions that appear to be related but that may not have been identified consistently as a particular concept. Further exploration may reveal that the characteristics of the concept are undefined or vague within the literature in that discipline. Concept exploration can help to provide a label for the phenomena and may start to flesh out the phenomena so that further development of the concept may occur.

The goals of a concept exploration are similar regardless of the maturity of the concept. If it is a new or unknown concept, then the goal is simply to raise awareness about the concept in the appropriate discipline and to try to get people interested in finding out more about the concept. If it is a taken-for-granted concept, the goal of a concept exploration is to illustrate the ambiguities present in the current use of the concept and to illustrate how the concept may be expanded to be more useful or appropriate to the discipline. Whether a concept exploration introduces a new concept or explores an old concept in a new way, the primary goal is to demonstrate whether or not there is a reason to continue to explore a concept.
In contrast to some of the other strategies, the procedures for performing a concept exploration are purposefully vague. This gives the researcher more latitude to explore the concept and provide a rich and meaningful description. Meleis (2007) proposed that a concept exploration should identify the major components of the concept, raise questions about each of these components, and examine the relevance of the components to a particular discipline. The researcher should also identify triggers for the continued exploration of the concept and define advantages of this continued exploration to the discipline. The ultimate goal of the research should be to determine whether or not there is sufficient reason to continue with research on this concept.

One example of a concept exploration is Norris's (1985) study on the novel concept of primitive pleasure in nursing practice (Norris, 1985). This study was primarily an exploration of nursing goals with a particular emphasis on what nurses were hoping to achieve in their interactions with patients. Using clinical examples and examples from the literature, Norris postulates that the goal of traditional nursing is to facilitate what she called homeostasis, or a return of the patient to a neutral state of physical and emotional being (Norris, 1985). However, she argues that people have a need for pleasure that runs deeper than the cognitive pleasure that comes to mind and that tapping into this reflexive or bodily pleasure should be (and is) a goal for nursing care. She called this pleasure primitive pleasure (Norris, 1985). The goals of the paper are simply to introduce the concept of primitive pleasure to the audience, to explore the application of this concept to nursing, and to argue that there are benefits to the profession for the further exploration of this concept.

7.4.2 Concept clarification

Concept clarification is quite a different strategy from concept exploration. It is used to develop concepts that have already been introduced into the literature but either do not have much literature to draw on or are not well-defined within that literature (Morse, Hupcey, et al., 1996). It is also useful if a concept appears to have
overlapping meanings or usage with related concepts (Meleis, 2007). Morse describes two subcategories of concept clarification in her work: concept delineation and concept comparison (Morse, Hupcey, et al., 1996). In Morse’s work, concept delineation is a methodology used to separate meaning between two concepts while concept comparison is used to clarify meaning among multiple concepts. In contrast to those concepts that are appropriate for a concept exploration (in which it is difficult to identify the characteristics of the concept), it may be possible to identify characteristics of concepts that are appropriate for concept clarification. However, these characteristics may be poorly defined or the concept may have poorly defined borders with related concepts.

The goals of concept clarification mirror these indications. In general, the goals of a concept clarification are to refine and expand on the various components of a concept within a specific discipline and to establish clearer boundaries between a concept and its related concepts. Again, there are multiple methods for concept clarification. However, the pioneering work on concept clarification was completed by Norris and includes the following steps (Norris, 1982):

- Identify a concept within a discipline and consider how it is described in other disciplines. Describe the characteristics of the concept.
- Systematically review observations and descriptions of concept. Reflect on patterns and sequences of events. What events trigger the phenomenon? What are the antecedents? Consequences?
- Develop operational definitions and ask, “How will I know the concept when I see it?”
- Construct a theoretical model of the concept.
- Develop hunches and hypotheses about the concept in order to move to an experimental model.

In order to accomplish these steps, concept clarification requires a careful review of the relevant literature and critical analysis of how the concept is related to a
discipline. Although most strategies for concept clarification rely on the illustration of a model case, they typically do not include development of the contrary and related cases that are essential to concept analysis (Meleis, 2007). Instead, concept clarification relies on the critical thinking and analysis of the researcher to refine the concept in question.

Hall, Stevens and Meleis (1994) completed a concept clarification that examined the concept of marginalization in nursing practice (Hall, Stevens, & Meleis, 1994). Although this was not a new concept to nursing, marginalization was often used interchangeably with related concepts such as alienation, stigmatization, and segregation. The authors completed a literature search and defined the characteristics of marginalization as intermediacy, differentiation, power, secrecy, voice and liminality (Hall, et al., 1994). Each of these characteristics was defined and related to the concept as a whole. The authors also made a case for importance of recognizing how marginalization may be related to nursing practice and for the continued study of this concept.

7.4.3 Standard concept analysis

Standard concept analysis is used to refine concepts that are already in existence and have been defined and partially clarified¹. However, the concept may need further development or the authors may want to explore the concept in a different discipline. Concepts that are appropriate for a full concept analysis are well represented in the literature and should be at least partially mature so that the characteristics can be identified and analyzed. Regardless of use, the general goals

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¹ The term concept analysis may be used to refer to the general strategies of concept analyses or to a specific type of concept analysis. I will use standard concept analysis in this thesis to refer to the specific type of concept analysis and concept analysis to refer to the general form of enquiry in order to differentiate the two meanings.
of a standard concept analysis are to provide a deeper, more complete or more relevant understanding of a concept within a particular discipline (Meleis, 2007).

There are several different strategies for standard concept analyses. One of the most commonly cited strategies is the method developed by Wilson in 1963 (Meleis, 2007). As adapted for nursing by Walker and Avant (2005), this method includes a series of steps:

- Select a concept for development.
- Determine the aims of the analysis.
- Identify all uses of concept in a comprehensive literature review.
- Determine the defining attributes of the concept.
- Construct a model case that includes all the attributes of the concept.
- Construct cases
  - Borderline: includes some but not all of the attributes
  - Related: case that may illustrate a related concept (e.g. stress versus distress)
  - Contrary: similar setting but does not illustrate attributes of concept
  - Invented case: cases that are taken out of context in order to illustrate the concept in a novel setting (i.e. from the perspective of an animal)
- Identify antecedents and consequences
- Define empirical referents, or categories of actual phenomena that, by their presence or existence, demonstrate the occurrence of the concept.

Ridner’s (2004) concept analysis of psychological distress in general healthcare literature and as described throughout this chapter is a good illustration of Walker and Avant’s methods.

**7.5 Theoretical and methodological background for Study II**

The first step in performing any form of concept analysis is to identify a concept of interest. As described in Chapter 6, I identified psychological distress as my
concept of interest based upon my clinical experiences as a hand therapist and the results of Study I (see Chapters 5 & 6). Congruent with Lazarus and Folkman’s theories on stress (Lazarus & Folkman, 1984), I hypothesised that viewing psychological distress as a broad independent concept directly related to the context/situation may provide insight into the type of distress seen in an outpatient physiotherapy/hand therapy clinic; insight that is not evident when distress is viewed as symptoms of pathological psychiatric conditions (see Chapter 6). The value of a broad, context-specific view of psychological distress was suggested by the results of Study I (see Chapters 5 & 6) and by an analysis of the concept of psychological distress within the nursing literature (Ridner, 2004). However, this conceptualization of psychological distress is quite different from what I was seeing in the literature about traumatic upper limb injury. Therefore, although psychological distress is not a new concept, the view of psychological distress as a broad emotional reaction to the specific stressors related to traumatic upper limb injuries may be new to the various disciplines that treat traumatic upper limb injuries.

Therefore, the goals of a concept exploration appeared most closely aligned with my goals for a concept analysis. In general, the primary goals of a concept exploration are to raise awareness of a concept or to point out that the meaning of a concept has become vague or ambiguous within a specific discipline or research area (Meleis, 2007). As such, the potential usefulness of that concept is diminished and further exploration of that concept is difficult. The central components of a concept exploration include identifying the major components of the concept as they are currently presented and asking questions about the relevance of those components to a particular discipline (Meleis, 2007). This form of analysis also charges the researcher with proposing ways in which to move research on a concept forward and to justify why further exploration is important to a given profession (Meleis, 2007). As psychological distress appeared to be a relatively immature concept within the context of traumatic upper limb injury research, these goals were appropriate for my analysis.
Another important consideration in choosing a method for concept analysis is the theoretical perspective underpinning exploration. Within each of the categories of concept analyses described above, multiple theorists have developed specific methods for performing a concept analysis based upon their ontology. Given that the results of Study I suggested that the context of recovery was important in evaluating psychological distress following upper limb injuries (see Chapter 5), I identify most closely with the theoretical basis of the Evolutionary Method of concept analysis (Rodgers, 1989, 1993). Within the theoretical basis of the Evolutionary Method, Rodgers argued that concepts are constantly evolving relative to their place in time and environment (Rodgers, 1989). As such, the concept of psychological distress may have a distinct meaning within the environment of recovery from mild to moderate traumatic upper limb injuries. Although Rodgers does not differentiate between different types of concept analyses, she does recognise that concept analyses may be used to accomplish different goals by different researchers (Rodgers, 1989). Chapter 8 presents a concept exploration performed within the theoretical framework of Rodgers’ Evolutionary Method of concept analysis (see Chapter 8 for further details on Rodger’s Evolutionary Method).

7.6 Chapter Summary
In this chapter I provided an overview of the methods of a concept analysis and a description of the components of a concept. I also introduced the idea of concept maturity and a briefly presented the debate surrounding the relationship between the characteristics of a concept and the context in which they occur. Finally, I described my rationale for choosing the Evolutionary Method of concept analysis as the theoretical basis for the concept exploration of psychological distress presented in Chapter 8.
Chapter 8

Psychological Distress After Hand Injury: An Evolutionary Concept Analysis

8.1 Chapter overview
In this chapter, I present an Evolutionary concept analysis of psychological distress within the interdisciplinary fields related to upper limb injury and recovery. The potential confusion created by the variable use of the term psychological distress within healthcare literature and the benefits of working to establish psychological distress as an independent concept are outlined. After explaining the methods of Evolutionary concept analyses, I show that psychological distress is primarily used as a categorical label with minimal reference to psychological distress as an independent concept within the literature related to traumatic upper limb injuries. The attributes, antecedents, consequences and related concepts for psychological distress are reported. I define psychological distress based upon these findings, and I describe the clinical and research implications.

8.2 Introduction
Psychological distress is a term commonly used, but poorly defined, in injury-related literature to describe psychological reactions to injury or illness. Distress following traumatic injury is typically portrayed as a negative emotional or psychological phenomenon and has been identified in people with such diverse diagnoses as burns (Fauerbach, et al., 2001), multiple trauma (Mason, Turpin, Woods, Wardrope, & Rowlands, 2006), and hand injuries (Gustafsson & Ahlstrom, 2006). It has been suggested that distress following upper limb injuries may be particularly harrowing due to the public nature of hands and their role in communication and intimacy (Grunert & Maksud, 1993). However, the lack of transparency about what is meant by the term psychological distress within healthcare literature and in clinical use has the potential to create confusion for patients, clinicians and researchers trying to understand and address the psychological sequelae of traumatic injuries. For this
reason, it is important to develop a clear understanding of the concept of psychological distress.

The term psychological distress and related terms such as emotional distress are used within healthcare literature to refer to a variety of concepts. In her concept analysis of psychological distress, Ridner (2004) alludes to the confusion in health-related literature created by the overlapping use of the terms of stress, strain, and distress. Psychological distress has also been used in health-related studies to refer to psychological concepts such as depression (Dyrbye, Thomas, & Shanafelt, 2006; Russ, et al., 2012; Singer, et al., 1999; Watson, et al., 1995; Zalai, Szeifert, & Novak, 2012), anxiety (Dyrbye, et al., 2006; Russ, et al., 2012; Singer, et al., 1999; Watson, et al., 1995), and other psychiatric symptom patterns (e.g. obsessive-compulsive behaviour, paranoia, hostility, and psychoticism) (Singer, et al., 1999). It has been used to refer to a single psychological condition (i.e. depression) (Zalai, et al., 2012) or as a ‘catch-all’ term for a number of psychological disorders or symptoms (Singer, et al., 1999). The variable use of psychological distress makes it difficult for healthcare researchers to compare the results of different studies. For instance, if two studies report that psychological distress leads to increased levels of disability, but one study defines psychological distress as combined variable including depression and anxiety while the other refers to symptoms of post-traumatic stress disorder (PTSD), it is difficult to compare the results of the two studies or to evaluate the relationship between any of the underlying forms of distress on disability.

The nebulous definition of psychological distress within healthcare literature also creates a problem for clinicians. The multiple concepts associated with the term psychological distress create confusion in conversations clinicians may have with patients or co-workers. For example, it might be critical to identify symptoms of PTSD in an individual who has recently sustained a severe traumatic hand injury. If team members report these symptoms as psychological distress in written notes without elaborating on their nature, this distress may be interpreted as a mild presentation of anxiety and be characterised as non-urgent. These issues suggest that an attempt to clarify the term psychological distress in the context of traumatic upper limb injuries is warranted.
There has been some attempt to develop psychological distress as a unique concept in both healthcare and social science literature (Bruch, Rivet, & Laurenti, 2000; Lazarus, 1998a; Lazarus, 1998b; Massé, 2000; Ridner, 2004). Ridner (2004) explored the concept of psychological distress in a wide range of medical and social science literature and produced a definition of psychological distress as “the unique discomforting, emotional state experienced by an individual in response to a specific stressor or demand that results in harm, either temporary or permanent, to the person” (Ridner, 2004) (p. 539). Ridner also distinguished psychological distress from the related concepts of stress, distress and biological distress and identified a number of characteristics of psychological distress. She reported factors required to produce psychological distress (antecedents) and consequences of psychological distress. Ridner’s analysis serves to provide a rich understanding of psychological distress as a unique emotional state independent of the related concepts associated with it.

While Ridner’s analysis of psychological distress as a unique concept is useful, its applicability to recovery from a traumatic upper limb injury is restricted. For instance, Ridner drew upon both medical and non-medical literature to describe psychological distress. As such, the characteristics of psychological distress she describes are fairly general. It is possible that there are characteristics of psychological distress following traumatic upper limb injuries that are unique to this population and that may help to explain the impact of psychological distress on recovery from injury. This assertion is supported by the results of Study I, which suggested that post-injury distress was most closely related to disability (see Chapter 5). In addition, based upon a cursory review of the literature related to upper limb injuries, the concepts most closely associated with psychological distress within this literature appear to be stress, anxiety and depression rather than stress, distress and strain. These inconsistencies are unsurprising within the ontological viewpoint that concepts are context- and time-dependent (Risjord, 2009). In order to develop a better understanding of how psychological distress is manifested within the context of recovery from a traumatic upper limb injury, it is important to explore the concept of psychological distress within the literature related to this specific field.
The key aims of this concept analysis are to explore: 1) the use of the term psychological distress within the interdisciplinary literature related to traumatic upper limb injury, 2) psychological distress as a distinct concept within this research area, and 3) the utility and limitations of this presentation of psychological distress.

8.3 Methods

8.3.1 Design

Rodgers’ Evolutionary Method of concept development was used as a theoretical basis for this concept analysis because of her ontological position that concepts evolve over time and vary between situations (Rodgers, 2000). This viewpoint is congruent with my assumption that the psychological distress experienced by individuals recovering from upper limb injuries is closely tied to their experience of recovery (see Chapter 6). Rodgers’ approach includes an inductive thematic analysis of the literature related to the discipline or area of interest in order to identify the attributes (characteristics) of the concept along with surrogate terms, antecedents and consequences, and related concepts. She describes five phases to her method, although she cautions that these phases may not necessarily occur consecutively (Rodgers, 1993):

1. Identify a concept of interest and associated terms (surrogate terms)
2. Identify and select an appropriate setting
3. Collect relevant data and describe the antecedents, characteristics, and consequences of the concept
4. Provide an exemplar if appropriate
5. Discuss implications of results, hypotheses, and areas for further development

This chapter presents the results of steps three, four and five while steps one and two were detailed in Chapter 6, where I provide the background information for Part 2 of this thesis. Step 4 was deliberately omitted in this analysis. Although the term psychological distress is not new within the literature related to upper limb injuries, the view of psychological distress as a distinct concept may be (See Section 8.4.1). Because of the emerging nature of psychological distress as an independent concept within fields involved in traumatic upper limb injuries, I felt it was
premature to include a model or exemplar case. There is precedence for this decision in health-related literature (Baisch, 2009).

8.3.2 Data selection

A systematic literature search was conducted using the Medline, AMED, Embase, PsycINFO, Web of Science and CINAHL databases from date of inception to July 18, 2014. To explore all uses of the term distress, this was searched as a keyword in all databases. Within the PsycINFO, Web of Science and CINAHL databases, this search was broken further into keyword (or topic) searches for the related terms psychological distress, emotional distress and traumatic distress (combined with the Boolean operator OR) due to the large number of citations returned with the search for distress.mp. For the purposes of the literature search related terms included the terms emotional distress, traumatic distress, and distress. Next, I searched for literature specific to traumatic injury of the upper extremity. The search within Medline, AMED and Embase used MESH terms. Due to differing terminology in the remaining databases, the remaining database searches contained a combination of MESH terms and keyword searches (See Table 8.1).

Table 8.1: Search terms used in databases

<table>
<thead>
<tr>
<th>Database</th>
<th>Search terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medline, AMED,</td>
<td>MESH terms: exp Hand OR exp Wrist OR exp Elbow OR exp Radius Fractures OR exp</td>
</tr>
<tr>
<td>Embase</td>
<td>Ulna Fractures OR exp Hand Injuries OR exp Arm Injuries</td>
</tr>
<tr>
<td>PsycINFO</td>
<td>[exp Hand (Anatomy) OR exp Wrist OR exp Elbow (Anatomy) OR exp Arm Anatomy or elbow.mp OR hand injuries.mp OR wrist injuries.mp OR hand.mp]</td>
</tr>
<tr>
<td>Web of Science</td>
<td>[TS = “hand” OR “wrist” OR “elbow” OR “radius fracture” OR “ulna fracture” OR “hand injur*” OR “wrist injuries”]</td>
</tr>
<tr>
<td>CINAHL</td>
<td>[Hand Injuries OR Hand Deformities, Acquired OR Stiff Hand, Post-Traumatic OR Wrist Injuries OR Forearm Injuries OR Wrist Fractures OR exp Wrist OR Upper Limb]</td>
</tr>
</tbody>
</table>
The two searches were then combined using the Boolean operator AND. Reference lists of all included articles were scanned for potentially eligible studies/reviews. All searches were limited to literature published in English.

Articles were included if the content was directly related to psychological reactions to traumatic upper limb injuries, regardless of publication type, and 1) included the term psychological distress (or related terms psychological distress, emotional distress, and distress, or traumatic distress) within the title, abstract, or content of the article, 2) for empirical research, the study sample had >25% with traumatic upper limb injuries OR results for those with upper limb injuries were reported separately to those with other injuries. The 25% threshold was deliberately low because it seemed likely the number of publications relevant to the concept of psychological distress in this population was few and I did not want to exclude directly relevant papers where a meaningful minority had hand injuries. Records were excluded if study samples were made up exclusively of those suffering from chronic regional pain or injuries caused by suicide attempts as it was felt that both of these conditions may be associated with psychological reactions that are not typical of individuals with traumatic injuries. Similarly, publications reporting primarily on repetitive strain injuries, pain of unknown origin, other upper limb pain of non-traumatic cause, or upper limb pain caused by disease processes were also excluded.

Initially, screening for inclusion was by title and abstract. Records with no evident coverage of emotional reactions following traumatic upper extremity injury were excluded. Full text PDF files were obtained for those articles which appeared to meet all inclusion criteria (and were not excluded) or if it was impossible to determine relevance through title and abstract. I then read these papers in full to confirm inclusion or exclusion.

8.3.3 Data analysis

Analysis was completed in two phases. In the initial phase, articles were screened to determine whether the term psychological distress (and related terms as described above) was used consistently throughout the paper and if it appeared to be used as an independent concept or as a categorical label to tie together several related
terms. In contrast to a concept, a label is simply a repository for a collection of similar data (Morse, Mitcham, Hupcey, & Tason, 1996). If the latter was true, related concepts were noted and reported as components of the category referred to as psychological distress. This information is reported in the section 8.4.1 entitled Part I: Defining the term psychological distress as a category or a concept.

In the second phase, data were analysed following the Evolutionary Method of concept analysis (Rodgers, 1989, 1993; Rodgers & Knafl, 2000). To achieve this, the articles were revisited and all sections of each article (including title, abstract, introduction, methods, results, and discussion) coded using an inductive thematic analysis approach with the view of psychological distress as an independent concept (Rodgers, 1993). This phase involved extracting information from the reports into a priori categories reflecting the components of a concept (the attributes, antecedents, outcomes and related concepts of psychological distress) (see Chapter 7, section 7.2.1). All coding was completed within the Nvivo software package. The coding was inductive because the process was approached with an open mind to what these aspects of psychological distress might contain (Elo & Kyngäs, 2008).

8.4 Results

A flowchart summarising the results of screening is shown in Figure 8.1 in order to provide transparency about the research process as recommended by the PRISMA Statement (PRISMA, 2015). From 1,077 electronic search records (and 16 further papers identified through reference list searches), 40 studies were potentially eligible for inclusion. Of these, 16 were excluded because they focused on upper extremity diseases or non-traumatic issues like repetitive strain injuries. One paper was excluded because less than 25% of the study population had sustained upper limb injuries and the results were not broken down by diagnosis. This left a total of 23 articles included in this concept analysis (see Table 8.2).
Figure 8.1: Flow diagram illustrating the results of data search
<table>
<thead>
<tr>
<th>First author</th>
<th>Study design</th>
<th>Study aims</th>
<th>Population</th>
<th>Diagnosis</th>
<th>Primary finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chaudhury (2009)</td>
<td>Cross-sectional</td>
<td>Prevalence of psychological distress</td>
<td>Limb fracture</td>
<td>Limb fracture patients had higher levels of psychological distress than controls.</td>
<td>Limb fracture patients had higher levels of psychological distress than controls.</td>
</tr>
<tr>
<td>Field (1997)</td>
<td>Prospective cohort study</td>
<td>Determine relationship between distress and development of chronic pain</td>
<td>Wrist fractures</td>
<td>No relationship between psychological distress and development of chronic pain following distal radius fractures.</td>
<td>No relationship between psychological distress and development of chronic pain following distal radius fractures.</td>
</tr>
<tr>
<td>Clay, FJ (2010)</td>
<td>Prospective longitudinal cohort study</td>
<td>Determine factors predicting time away from work following acute ortho trauma</td>
<td>Acute orthopaedic trauma</td>
<td>Psychological distress (depression, anxiety) at 2 weeks post-injury was not significantly different between those who returned to work and those who did not.</td>
<td>Psychological distress (depression, anxiety) at 2 weeks post-injury was not significantly different between those who returned to work and those who did not.</td>
</tr>
</tbody>
</table>

Table 8.2: Articles included in concept analysis of psychological distress.
<table>
<thead>
<tr>
<th>First author</th>
<th>Study title and design</th>
<th>Study aims</th>
<th>Population</th>
<th>Diagnosis</th>
<th>Study design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gustafsson (2006)</td>
<td>Cross-sectional study</td>
<td>Prevalence of psychological distress</td>
<td>Traumatic hand injuries at work (included in concept analysis of psychological distress)</td>
<td>N = 112 (64% of sample)</td>
<td>Cross-sectional study</td>
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<tr>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Emotional distress (symptoms of PTSD)</td>
<td>Cross-sectional study</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&gt;50% sample experienced symptoms</td>
<td>Cross-sectional study</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Emotional distress not correlated with age, marital status, employment before accident</td>
<td>Cross-sectional study</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Emotional distress not correlated with age, marital status, employment before accident</td>
<td>Cross-sectional study</td>
</tr>
</tbody>
</table>

|                       |                        |            |            | Emotional problems in early days after injury | Cross-sectional study |
|                       |                         |            |            | Emotional problems in early days after injury | Cross-sectional study |

|                       |                        |            |            | >50% sample experienced symptoms | Cross-sectional study |
|                       |                         |            |            | >50% sample experienced symptoms | Cross-sectional study |
|                       |                         |            |            | >50% sample experienced symptoms | Cross-sectional study |

(continued) Table 8.2: Articles included in concept analysis of psychological distress
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<table>
<thead>
<tr>
<th>First author</th>
<th>Study design</th>
<th>Study aims</th>
<th>Population</th>
<th>Diagnosis</th>
<th>Primary finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lam, K. (2011)</td>
<td>Cross-sectional study</td>
<td>Prevalence of perceived psychological distress</td>
<td>N = 86 (43 upper and 43 lower limb)</td>
<td>Injury-related distress</td>
<td>No difference between upper limb and lower limb</td>
</tr>
<tr>
<td>Moseley</td>
<td>Prospective cohort study</td>
<td>To quantify the incidence of CRPS and to predict who may develop CRPS</td>
<td>N = 1,549</td>
<td>Wrist fractures, shoulder pain, elbow pain</td>
<td>Excessive pain in the first week after injury; subsequent pain and depression in the first month; and above normal levels of both PTSD and depression in 2 months of follow-up. 93% of respondents had high PTSD and PSD2. 2% of respondents had high PTSD and PSD2. 2.9% of respondents had high PTSD and PSD2. 2.9% of respondents had high PTSD and PSD2.</td>
</tr>
<tr>
<td>Richards, T. (2011)</td>
<td>Cross-sectional survey study</td>
<td>To assess psychological outcomes and disability following severe hand injury</td>
<td>N = 34</td>
<td>Emergency hand surgery</td>
<td>Disability strongly related to pain, depression, and PTSD. 29% of respondents had high levels of both PTSD and depression, an average of 15 months post-injury. Symptoms of psychological distress persisted after physical injury.</td>
</tr>
<tr>
<td>Victorson, DE (2005)</td>
<td>Prospective cohort study</td>
<td>To identify coping strategies related to injury-related distress in a mixed sample of individuals with traumatic injury</td>
<td>N = 68 ([hand injured = 22 (32%)], multiple trauma = 35, burn injured = 33), multiple injury, individual with traumatic injury associated with injury-related distress.</td>
<td>Certain coping strategies (emotional venting, substance use, and denial) were associated with behavioral disengagement self-blame.</td>
<td>Certain coping strategies (emotional venting, substance use, and denial) were associated with behavioral disengagement self-blame.</td>
</tr>
</tbody>
</table>
| Lam, K. (2011) | Cross-sectional | Prevalence of perceived psychological distress | N = 86 (43 upper and 43 lower limb) | Injury-related distress | No difference between upper limb and lower limb | (continued) (Table 8.2: Articles included in concept analyses of psychological distress)
<table>
<thead>
<tr>
<th>First author</th>
<th>Study design</th>
<th>Study aims</th>
<th>Population</th>
<th>Diagnostic categories</th>
<th>Study primary findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cheung, E</td>
<td>Cross-sectional retrospective study</td>
<td>Prevalence of psychological factors</td>
<td>N = 30 upper and 25 lower limb amputations</td>
<td>Prevalence of depression and PTSD in upper limb amputees compared to lower limb amputees</td>
<td></td>
</tr>
<tr>
<td>Desmond, DM</td>
<td>Cross-sectional retrospective study</td>
<td>Prevalence of distress and relationship to coping strategies</td>
<td>N = 107 forearm nerve injuries</td>
<td>Moderate to severe psychological stress in first month post-op</td>
<td>Individuals with upper limb injuries had greater rates of PTSD and depression than those with lower limb injuries</td>
</tr>
<tr>
<td>Jaquet, JB</td>
<td>Retrospective cross-sectional study</td>
<td>Prevalence of PTSD</td>
<td>N = 50 Spaghetti wrist</td>
<td>Moderate to severe psychological symptoms were present in 64% of patients in the first month after injury</td>
<td>Anxiety not correlated with time since injury, but anxiety (18.1%) in moderate to severe levels, severe post-traumatic stress were correlated with PTSD and depression in upper limb amputees</td>
</tr>
<tr>
<td>Jaquet, JB</td>
<td>Retrospective cross-sectional study</td>
<td>Prevalence of distress and relationship to coping strategies</td>
<td>N = 138 upper limb amputation</td>
<td>Prevalence of distress and relationship to coping strategies</td>
<td>An individualized treatment plan based on possible clinical anxiety, anger, and depression, and the development of strategies to cope with these feelings</td>
</tr>
<tr>
<td>Sonmez, A</td>
<td>Retrospective cross-sectional study</td>
<td>Reveal psychological factors of patients who intentionally injure themselves</td>
<td>N = 21 men self-induced injury from puncturing glass</td>
<td>Moderate to severe psychological symptoms were present in 64% of patients in the first month after injury</td>
<td>Patients who injured themselves by punching a window had higher levels of psychological distress, hostility, and anger than those who injured themselves by punching a window.</td>
</tr>
</tbody>
</table>
Table 8.2: Articles included in concept analysis of psychological distress

<table>
<thead>
<tr>
<th>First author</th>
<th>Study design</th>
<th>Study aims</th>
<th>Population</th>
<th>Diagnosis</th>
<th>Primary finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gustafsson, S (2004)</td>
<td>Prospective longitudinal cohort study</td>
<td>Investigate changes in psychological distress over 1 year following injury</td>
<td>N = 91</td>
<td>Psychological and physical distress</td>
<td>Improvement in distress and mood disorders</td>
</tr>
<tr>
<td>Gustafsson, S (2002)</td>
<td>Qualitative study</td>
<td>Identify coping strategies used by hand injured patients to manage emotional reactions to injury</td>
<td>N = 20</td>
<td>Acute traumatic hand injury</td>
<td>All participants identified aspects of recovery as distressing. 11 different strategies to manage this distress were identified.</td>
</tr>
<tr>
<td>Hannah, S (2011)</td>
<td>Review</td>
<td>Summarise impact of severe hand injury from psychological perspective</td>
<td>N/A</td>
<td>Traumatic hand injury</td>
<td>Participants identified psychological impact of severe hand injury, self-reported a variety of symptoms (e.g., self-reported psychological distress, anxiety, depression).</td>
</tr>
<tr>
<td>First author</td>
<td>Study design</td>
<td>Study aims</td>
<td>Population/Diagnosis</td>
<td>Primary findings</td>
<td>Evidence type</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------</td>
<td>------------</td>
<td>----------------------</td>
<td>------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Koester</td>
<td>Review</td>
<td>To assist the hand therapist, to develop a better understanding of the psychological impact of psychological distress for recovery from hand injuries</td>
<td>Combined median, ulnar nerve repair</td>
<td>Psychological distress following peripheral nerve injuries is common. Predictors of intensity of psychological distress post-injury are:</td>
<td>Evidence of factors that influence outcome following traumatic hand injuries</td>
</tr>
<tr>
<td>Tocco, I</td>
<td>Review</td>
<td>To describe the psychological impact of mutilating hand injuries on family and individuals following mutilating hand injuries</td>
<td>Mutilating hand injuries</td>
<td>Psychological factors ((pain, PTSD, anxiety, depression) should be discussed with patients experiencing a range of problems</td>
<td>Evidence of factors that influence outcome following traumatic hand injuries</td>
</tr>
<tr>
<td>Meyer, TM</td>
<td>Review</td>
<td>To describe the psychological impact of mutilating hand injuries on family and individuals following mutilating hand injuries</td>
<td>Mutilating hand injuries</td>
<td>Psychological factors ((pain, PTSD, anxiety, depression) should be discussed with patients experiencing a range of problems</td>
<td>Evidence of factors that influence outcome following traumatic hand injuries</td>
</tr>
<tr>
<td>Yaghjian, GV</td>
<td>Review</td>
<td>Review of factors that influence outcome following peripheral nerve injuries</td>
<td>Combined median, ulnar nerve repair</td>
<td>Psychological distress peripheral nerve injuries is common. Predictors of intensity of psychological distress post-injury are:</td>
<td>Evidence of factors that influence outcome following traumatic hand injuries</td>
</tr>
</tbody>
</table>

Table 8.2: Articles included in concept analysis of psychological distress
Recognition of those at risk for developing PTSD may influence functional outcome.
8.4.1 Part I: Defining the term psychological distress as a category or a concept

Within the articles included in this concept analysis, authors frequently employed the term psychological distress and related terms such as affective distress, emotional distress, and distress to describe emotional reactions to injury. However, most authors did not define psychological distress as a unique concept. Instead, psychological distress was presented as a label for a broad category made up of combinations of psychological and emotional concepts. This category was presented in one of three ways. First, distress was used by three authors as a composite variable representing a combination of factors (Clay, et al., 2010; Gustafsson & Ahlstrom, 2006; Victorson, Enders, Burnett, & Ouellette, 2008). (See Table 8.3).

Table 8.3 Composite variable views of distress

<table>
<thead>
<tr>
<th>Author</th>
<th>Synonymous terms</th>
<th>Components included in composite view of distress</th>
<th>Measurement tools used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clay, FJ (2010)</td>
<td>Psychological distress</td>
<td>Depression AND anxiety AND stress</td>
<td>Depression, Anxiety, Stress Scale -21 (DASS)</td>
</tr>
<tr>
<td>Gustafsson (2006)</td>
<td>Psychological problem, emotional distress</td>
<td>Anxiety AND depression (score higher than 8 on HADS – below that not distress)</td>
<td>Hospital Anxiety and Depression Scale (HADS)</td>
</tr>
</tbody>
</table>

For example, Clay, et al. (2010) defined psychological distress as a composite variable made up of “participants who reported symptoms of depression, anxiety, or stress regardless of severity” (p 422). Therefore, distress equals depression AND anxiety AND stress.
A second group of authors used the term distress to describe a category of related psychological concepts (Chaudhury, 2009; Cheung, Alvaro, & Colotla, 2003; Desmond, 2007; Field & Gardner, 1997; Hannah, 2011; Koestler, 2010; Lam, Chan, & Lam, 2011; Meyer, 2003; Sonmez, et al., 2010; Victorson, Farmer, Burnett, Ouellette, & Barocas, 2005).

### Table 8.4: Categorical views of psychological distress

<table>
<thead>
<tr>
<th>Author</th>
<th>Synonymous terms</th>
<th>Concepts included</th>
<th>Measurement tools used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chaudhury (2009)</td>
<td>Psychological health and wellness (GHQ), “psychological distress and psychiatric morbidity” used together without differentiating</td>
<td>Depression, alcoholism, state anxiety, trait anxiety, PTSD, mental fatigue, perceived stress, psychological health and wellness</td>
<td>GHQ, IES, Michigan Alcoholism Screening Test, CRSD, STAI, Multidimensional Fatigue Inventory, Perceived Stress Questionnaire, Somatic Inkblot Series-II, interview with psychiatrist</td>
</tr>
<tr>
<td>Cheung, E (2003)</td>
<td>Psychological difficulties, emotional difficulties</td>
<td>PTSD, depression</td>
<td>N/A – Review of notes in chart by authors</td>
</tr>
<tr>
<td>Desmond, DM (2007)</td>
<td>Affective distress</td>
<td>Depression, anxiety</td>
<td>Hospital Anxiety and Depression Scale (HADS)</td>
</tr>
<tr>
<td>Field (1997)</td>
<td>Emotional distress, psychiatric disturbance (GHQ), psychologically disturbed</td>
<td>Psychiatric disturbance</td>
<td>General Health Questionnaire (GHQ)</td>
</tr>
<tr>
<td>Hannah, S (2011)</td>
<td>Trauma-related distress vs. Emotional distress, psychosocial distress, stress</td>
<td>Intense emotions (anxiety, guilt, fear, sadness, anger, etc.)</td>
<td>N/A – Review of literature</td>
</tr>
<tr>
<td>Koestler (2010)</td>
<td>Affective distress, psychological distress, emotional distress, distress, stress, marital distress, bodily distress</td>
<td>Any negative psychological symptom</td>
<td>N/A – Review</td>
</tr>
</tbody>
</table>
(continued) Table 8.4: Categorical views of psychological distress

<table>
<thead>
<tr>
<th>Author</th>
<th>Synonymous terms</th>
<th>Concepts included</th>
<th>Measurement tools used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Richards, T (2011)</td>
<td>Psychological problem, psychiatric variables (psychiatric and psychological used interchangeably for depression, PTSD)</td>
<td>Depression, PTSD, pain, perceived stress</td>
<td>Screen for Posttraumatic Stress Symptoms (SPTSS), CES-D, Perceived Stress Scale</td>
</tr>
<tr>
<td>Sonmez, A (2010)</td>
<td>Psychological factors</td>
<td>Somatization, obsessive-compulsive behaviour, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid psychoticism and other symptoms such as sleep disorders and eating disorders, feelings about positive distress symptoms, trait anxiety, anger</td>
<td>Symptoms Distress Checklist 90</td>
</tr>
</tbody>
</table>

GHQ = General Health Questionnaire; IES = Impact of Event Scale; CRSD = Carroll Rating Scale for Depression; STAI = State-Trait Anxiety Inventory; CES-D = Center for Epidemiologic Studies – Depression; CRPS = Chronic regional pain syndrome; PTSD = Post-traumatic stress disorder

This was the most common strategy. In these articles, the term distress was used to refer to either one form of psychological distress (e.g. depression) or to a group of related forms of psychological symptoms. For example, Desmond (2007) used distress to refer to anxiety OR depression (or a combination of both). In reviews, the term distress was often preceded by a descriptor (such as marital or injury-related) to differentiate different types of distress (Hannah, 2011; Koestler, 2010).
For example, (Hannah 2011) described psychological distress (symptoms of PTSD), psychosocial distress (variable sources), marital distress, and emotional distress (anxiety AND depression). The components and the combinations of components which made up the variable psychological distress varied considerably by author (See Table 8.4)

A third group of authors used the term distress to refer to a single psychological concept (Gustafsson & Ahlstrom, 2004; Gustafsson, Amilon, & Ahlstrom, 2003; Hennigar, Saunders, & Efendov, 2001; Jaquet, et al., 2002; Jaquet, et al., 2005; Tocco, Salini, & Bassetto, 2011; Yaghjyan & Azatyan, 2010). Within this group, all authors used distress to refer to symptoms of PTSD (See Table 8.5).

Table 8.5: Single concept views of distress

<table>
<thead>
<tr>
<th>Author</th>
<th>Synonymous terms</th>
<th>Related concept</th>
<th>Measurement tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gustafsson (2004)</td>
<td>Trauma-related distress</td>
<td>PTSD</td>
<td>Impact of Event Scale (IES)</td>
</tr>
<tr>
<td>Gustafsson (2003)</td>
<td>Trauma-related distress, trauma-related stress, emotional problems</td>
<td>PTSD</td>
<td>Impact of Event Scale (IES)</td>
</tr>
<tr>
<td>Hennigar, C (2001)</td>
<td>Psychological difficulties</td>
<td>PTSD</td>
<td>Injured Workers Survey (IWS)</td>
</tr>
</tbody>
</table>
(Continued) Table 8.5: Distress used to refer to a single concept

<table>
<thead>
<tr>
<th>Author</th>
<th>Synonymous terms</th>
<th>Related concept</th>
<th>Measurement tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tocco, I (2011)</td>
<td>Psychological problems, trauma-related distress</td>
<td>PTSD</td>
<td>N/A - Review</td>
</tr>
</tbody>
</table>

PTSD = Post-traumatic stress disorder

Finally, three authors alluded to psychological distress as a unique concept (Gustafsson, Persson, & Amilon, 2002; Lam, et al., 2011; Moseley, 2004) (see Table 8.6). In his cross-sectional study of psychological distress following upper and lower limb fractures, Lam (2011) defined psychological distress as a “unique emotional state of discomfort experienced by an individual in response to a specific stressor or demand, which results in harm to that individual” (p. 785). This definition is borrowed from Ridner’s (2004) analysis of psychological distress as an independent concept within health-related literature. However, Lam (2011) went on to measure a narrow component of psychological distress, namely symptoms of PTSD, which is not congruent with his broader definition of psychological distress. Gustafsson (2002) also appeared to define psychological distress as a more general and independent concept in her exploration of coping strategies used by those who have sustained severe traumatic hand injuries. She described distress within the theoretical framework of stress as described by Lazarus & Folkman, which emphasises the role of cognitive appraisal in stress or distress and defines psychological distress as an interaction between an individual and an environment which the person appraises as threatening (Lazarus & Folkman, 1984). Although only mentioned in one instance, Moseley (2004) appears to refer to distress as an independent concept as a general “complication of injury” (p.16) without reference to related concepts.
Table 8.6: Uses of distress as an independent, global concept

<table>
<thead>
<tr>
<th>Author</th>
<th>Synonymous terms</th>
<th>Definition of distress</th>
<th>Measurement tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gustafsson (2002)</td>
<td>Psychological stress, response-reactions</td>
<td>Psychological distress discussed as a stand-alone emotional (resulting from stressors) concept as described by Lazarus</td>
<td>N/A - Interview</td>
</tr>
<tr>
<td>Koestler (2010)</td>
<td>Affective distress, psychological distress, emotional distress, distress, stress, marital distress, bodily distress</td>
<td>Differentiated from anger, depression and somatisation in one instance of use</td>
<td>N/A - Review</td>
</tr>
<tr>
<td>Lam, K (2011)</td>
<td>Consistently used psychological distress</td>
<td>Distress defined as a larger concept but measured as symptoms of PTSD</td>
<td>Impact of Event Scale (IES)</td>
</tr>
<tr>
<td>Moseley (2014)</td>
<td>Distressing</td>
<td>Complication of injury</td>
<td>N/A - Detailed physical evaluation, phone interview</td>
</tr>
</tbody>
</table>

PTSD = Post-traumatic stress disorder

Finally, although Koestler (2010) uses the term distress to refer to a variety of concepts in his review of hand injury and pain, in one instance she differentiates distress from the related concepts of anger, depression and somatisation (p. 2000), suggesting that distress may be a form of emotional expression in its own right.

8.4.1.1 Related concepts

The most common related concepts included anxiety (Clay, et al., 2010; Desmond, 2007; Victorson, et al., 2005; Victorson, et al., 2008), depression (Cheung, et al., 2003; Koestler, 2010; Victorson, et al., 2005; Victorson, et al., 2008), and post-traumatic stress (Cheung, et al., 2003; Gustafsson, et al., 2003; Jaquet, et al., 2002; Jaquet, et al., 2005; Koestler, 2010). Other less commonly referenced related concepts included stress (Clay, et al, 2010), somatisation (Koestler, 2010), pain (Victorson, et al., 2008), psychopathology (such as obsessive-compulsive disorder, hostility, phobic anxiety, paranoid psychoticism, and interpersonal sensitivity
(Sonmez, et al., 2010), and psychiatric morbidity (e.g. alcoholism, acute stress disorder, adjustment disorder) (Chaudhury, 2009).

Because the definition of distress was so closely related to the tool used to measure it in quantitative studies, looking closely at which tools were used was useful (see Table 8.7). Note that there was only one qualitative study included in this analysis, suggesting that more qualitative research about psychological distress in this population would be beneficial to develop the concept of psychological distress. Nearly every included quantitative study used a different tool to measure psychological distress. The most commonly used tool was the Impact of Event Scale (Horowitz, Wilner, & Alvarez, 1979), which screens for symptoms of post-traumatic stress. Although this tool is not intended to diagnose post-traumatic stress disorder (Horowitz, et al., 1979), the symptoms described in this tool largely mirror the symptoms of post-traumatic stress disorder in the DSM-IV (American Psychiatric Association, 2000). Similarly, the Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983) measures symptoms of depression and anxiety which reflect the symptoms of these disorders described in the DSM-IV. Table 8.4 illustrates the range of concepts which were used to define distress. Some papers used more than one of these tools while others limited their definition to that provided by one tool. The data show that because psychological distress as an independent concept is rarely used in the literature, there appears to be no single tool designed to measure it.
Table 8.7: Self-report tools used to measure psychological distress

<table>
<thead>
<tr>
<th>Title</th>
<th>Original article</th>
<th>Concepts measured</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptom Distress Checklist 90 (Should be Symptom Checklist 90)</td>
<td>SCL-90 (Derogatis, Lipman, &amp; Covi, 1973) and the SCL-90-R (Derogatis &amp; Cleary, 1977)</td>
<td>Originally intended to measure severity of psychiatric symptoms like somatisation, obsessive-compulsive disorder, depression, anxiety, hostility, phobic anxiety, paranoid ideation, psychoticism and interpersonal sensitivity. However, due to overlap with other scales, some authors have suggested that the SCL-90 measures a general discomfort dimension (Hoffman &amp; Overall, 1978). The revised edition (SCL-90-R) includes a Global Severity Index, which gives a measure of overall psychological distress and the Positive Symptom Distress Index, which measures the severity of symptoms.</td>
<td>(Sonmez, et al., 2010)</td>
</tr>
<tr>
<td>General Health Questionnaire</td>
<td>(Goldberg, 1972)</td>
<td>Designed to give a quantitative view of degree of overall psychological disturbance (not specific psychiatric diagnoses) found in primary care or non-psychiatric patients. Developed as a screening tool to detect those likely to have or be at risk of developing psychiatric disorders, it is a measure of the common mental health problems/domains of depression, anxiety, somatic symptoms and social withdrawal (Jackson, 2007).</td>
<td>(Chaudhury, 2009; Field &amp; Gardner, 1997)</td>
</tr>
<tr>
<td>Title</td>
<td>Authors</td>
<td>Date</td>
<td>Original article</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>----------------------------------</td>
<td>------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Depression, anxiety, and stress</td>
<td>Lovibond, et al., 1995</td>
<td>(Continued)</td>
<td>Table 8.7: Self-report tools utilized in the measurement of psychological distress</td>
</tr>
<tr>
<td>Authors</td>
<td>Title</td>
<td>Concepts measured</td>
<td></td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Davidson, et al. (1997)</td>
<td>Post-Traumatic Stress Disorder Inventory (PSD)</td>
<td>Startle, psychological</td>
<td></td>
</tr>
<tr>
<td>Vranceanu, Safren, Zhao, Cowan, et al. (2008)</td>
<td>Post-Traumatic Stress Screen for Symptoms (PTSS)</td>
<td>Startle, psychological</td>
<td></td>
</tr>
<tr>
<td>Carlson (2001)</td>
<td>Centers for Epidemiologic Study - Depression (CES-D)</td>
<td>Startle, psychological</td>
<td></td>
</tr>
<tr>
<td>Radloff (1977)</td>
<td>CES-D</td>
<td>Depressed mood, psychological</td>
<td></td>
</tr>
<tr>
<td>Richards, Garvert, McDade, et al. (2011)</td>
<td>Screening tool for PTSD symptoms (PTSS)</td>
<td>Startle, psychological</td>
<td></td>
</tr>
<tr>
<td>Carlson, et al. (2011)</td>
<td>SPTSS</td>
<td>Startle, psychological</td>
<td></td>
</tr>
</tbody>
</table>

(continued) Table 8.7: Self-report tools utilized in the measurement of psychological distress
8.4.2 Part II: Psychological distress as an independent concept

This section discusses the results of inductive coding undertaken to establish the current presentation of psychological distress as a distinct concept. Within the framework of Rodgers’ Evolutionary Method of concept analysis, the attributes, antecedents, consequences, and related concepts for psychological distress are described. The synonymous terms (or related terms) are included in Tables 8.3, 8.4 8.5, and 8.6.

8.4.2.1 Attributes of psychological distress

Characteristics or attributes are the defining characteristics of a concept that distinguish it from related concepts (Morse, 1995). Because psychological distress was rarely defined as a stand-alone concept within the traumatic hand injury literature and was used inconsistently as a categorical label, it was difficult to determine characteristics that distinguish it from related concepts. This analysis conceptualised nine attributes of psychological distress including it: 1) is troubling for the individual, 2) is a reaction to injury, 3) is a dysfunctional psychological state, 4) is comprised of symptoms of pathological psychological diagnoses, 5) presents along a continuum of severity with a threshold for problematic levels, 6) is a phenomenon that can be recognised and articulated by those experiencing it, 7) is a manageable condition, 8) is associated with social stigma, 9) results in negative consequences.

Psychological distress is troubling for the individual

Psychological distress was conceptualised as a negative emotional or psychological state that results in undesirable symptoms. For instance, Gustafsson referred to affective distress as a negative “mood state” (Gustafsson, et al., 2002) (p599) or “mood disorder” (Gustafsson, et al., 2003)(p 332) and reported that individuals may find distress “troublesome” (Gustafsson & Ahlstrom, 2004)(p 990). Although there is some disagreement about the expression of psychological distress, the symptoms of psychological distress described in the literature related to upper limb injuries were uniformly negative in nature and included such things as depression (Chaudhury, 2009; Gustafsson, et al., 2003), anxiety (Chaudhury, 2009; Desmond, 2007; Gustafsson, et al., 2003), stress (Clay, et al., 2010; Jaquet, et al., 2002; Jaquet, et al., 2005; Richards, et al.,
2011), and somatisation (Sonmez, et al., 2010). Due to its negative nature, distress was also considered to have a negative impact on an individual psychologically as evidenced by its association with terms such as “burden” (Richards, et al., 2011)(p. 1664).

**Psychological distress is a reaction to injury**

Psychological distress was generally portrayed as a reaction to the experience of sustaining and recovering from a traumatic injury; this reaction represented a negative change from a healthy psychological baseline (Field & Gardner, 1997; Gustafsson & Ahlstrom, 2004; Moseley, 2004; Victorson, et al., 2008). Psychological distress was not portrayed as a pre-existing psychiatric condition. In the early stages of recovery was described as a “normal” (Meyer, 2003)(p42) reaction to a traumatic injury. The factors leading to the development of psychological distress following traumatic were complex and multiple (Desmond, 2007; Gustafsson & Ahlstrom, 2004; Hannah, 2011). Some of the reasons given for the increase in distress following upper limb injuries include unknown functional prognosis, uncertainty of persistent pain, the disfigured appearance of the hand, the experience of the traumatic event itself, and dependence on others (Meyer, 2003). However, Gustafsson argues that distress develops following traumatic injury only when these factors are appraised as threatening and overwhelm an individual’s ability to cope (Gustafsson & Ahlstrom, 2006).

**Psychological distress is a dysfunctional psychological state**

Psychological distress was also portrayed as a dysfunctional psychological state following traumatic injury. Although some authors took pains to describe psychological distress as a normal reaction to injury, psychological distress was typically described as a “problem with psychosocial functioning” (Desmond, 2007) and was related to “poor psychological adjustment” (Clay, et al., 2010). Psychological distress was routinely used synonymously with phrases like “psychological problem” (Richards, 2011, p. 1664; Meyer, 2003,p. 41; Tocco, 2011, p. 276). As psychological distress was considered a dysfunctional state, the expected goals of healthcare providers were described as either to minimise or prevent the development of psychological distress (Clay, et al., 2010; Gustafsson & Ahlstrom, 2006) or facilitate “adjustment” to healthy psychological functioning (Clay, et al., 2010; Gustafsson & Ahlstrom, 2006; Hannah, 2011). The acceptability of psychological distress as a reaction to injury was also influenced by the
time elapsed since injury; Hannah (2011) argued that “stress responses are a normal response to trauma but that prolonged symptoms can impede progress and adjustment” (p. 98). However, the proposal that prolonged psychological distress should be addressed (Hannah, 2011; Meyer, 2003) implied that psychological distress may become pathological after a certain period of time. The timeframe for the transformation from expected to pathological was not clear, although Gustafsson (2004) found that symptoms of distress generally begin to improve at three months post-injury and implied that this might be an appropriate time to re-evaluate psychological state to identify those who might be in need of psychological help.

**Psychological distress is composed of symptoms of pathological psychiatric diagnoses**

Although psychological distress was generally characterised as non-pathological, it was presented as symptoms of pathological psychiatric conditions (Chaudhury, 2009; Field & Gardner, 1997; Hannah, 2011). The most common symptoms associated with psychological distress were those related to Post-Traumatic Stress Disorder such as flashbacks, nightmares, and avoidance behaviours (Hennigar, et al., 2001; Jaquet, et al., 2002; Jaquet, et al., 2005). Some authors suggested that the presence of these symptoms indicated a need for further evaluation of psychological disorder (Chaudhury, 2009; Lam, et al., 2011). In most articles, care was taken to point out that the measures used were not designed to diagnose pathological psychiatric conditions (Field & Gardner, 1997; Gustafsson & Ahlstrom, 2006; Hennigar, et al., 2001). However, authors measured psychological distress using tools designed to measure symptoms which mirror diagnostic psychiatric conditions as described in the DSM-IV (Lam, et al., 2011) (See Table 8.7).

**Psychological distress presents along a continuum of severity with a threshold for problematic levels**

Authors generally depicted psychological distress as existing along a continuum, with some individuals experiencing more or less psychological distress than others (Richards, et al., 2011; Sonmez, et al., 2010). Higher total (adjusted) scores on self-report measures (See Table 8.7 for examples of tools used) were indicative of greater symptomology or levels of distress (Desmond, 2007; Field & Gardner, 1997; Sonmez, et
al., 2010). In several studies, authors also designated a threshold (within scores on the self-report measures) that differentiated those who could be labelled as “cases” of distress and those who could not; distress below a specific threshold was portrayed as expected, while levels of distress above that threshold were indicative of a potential psychiatric disorder and warranted referral for further psychological evaluation (Chaudhury, 2009). However, some authors labelled any report of psychiatric symptoms as distress and those who reported no symptoms as non-cases (Clay, et al., 2010; Gustafsson & Ahlstrom, 2006).

**Psychological distress is recognised and articulated by those experiencing it**

As most of these studies relied on self-report measures, the results of this concept analysis hint that distress is conceptualised in this literature as something that individuals are able to recognize in themselves and communicate via self-report measures or interviews (See Table 8.7). However, there is some recognition that the willingness to communicate feelings of distress may be influenced by cultural norms (Lam, et al., 2011). In addition, there may be some bias in the scores on the self-report measures due to the way that participants from different socioeconomic, educational and cultural backgrounds express their psychological distress (Lam, et al., 2011).

**Psychological distress can be managed**

One of the most consistent messages portrayed by the literature in this review was that psychological distress may be controlled or managed. This control may be achieved through psychotherapy or psychotropic medications (Meyer, 2003), support groups with individuals who have sustained a similar injury (Hannah, 2011), graded work exposure (Grunert, Matloub, Sanger, & Yousif, 1990; Meyer, 2003), or appropriate application of coping mechanisms (Gustafsson & Ahlstrom, 2006). In addition, individuals have some “ability to maintain emotional well-being” (Desmond, 2007)(p. 15) through their “choice of coping strategy” (Gustafsson, et al., 2002)(p. 595). For instance, some coping styles, such as confrontational and emotive, were used more frequently in those who exhibited distress than in those who did not (Desmond, 2007; Gustafsson & Ahlstrom, 2006; Gustafsson, et al., 2002). Providing physical help during a daily task to a patient who copes by maintaining control might increase their distress unless the help can be given in such a way that the individual maintains a sense of
personal control over the situation (Gustafsson, et al., 2002). Suggestions that individuals who have been identified as exhibiting psychological distress would benefit from psychological referral also insinuate that psychological distress may be mitigated by treatment, potentially drug treatments (Gustafsson & Ahlstrom, 2006; Richards, et al., 2011).

**Psychological distress is associated with social stigma**

Psychological distress was associated with social stigma. Hannah (2001) reported that patients were often “hesitant to discuss their psychological issues because of the perceived stigma associated with stress behaviours and feelings” (p. 97) while Meyer (2003) reported that care should be taken so that the patients do not feel “they have been identified as being maladjusted or ‘crazy’” (p. 44). In some countries, such as in China, displaying psychological distress may be considered a sign of weakness, especially in men (Lam, et al., 2011). Within these cultures, the stigma is so strong that members of these societies may suppress feelings of distress (Lam, et al., 2011). It is conceivable that the stigma associated with psychological distress is present in other countries, such as New Zealand, but has not yet been reported in the literature relating to upper limb trauma.

**8.4.2.2 Antecedents to psychological distress**

Antecedents are things that need be in place in order for psychological distress to occur. Psychological distress requires a living, conscious human being who is able to communicate his or her thoughts and feelings, either verbally or non-verbally (e.g. through facial expressions or behaviours). A second antecedent is the occurrence of a stressor. As this concept analysis focuses on psychological distress as a context-bound phenomenon, the stressor is the experience of sustaining and recovering from a traumatic upper limb injury. Thirdly, some aspects of the experience of sustaining or recovering from a traumatic upper limb injury must be appraised by the individual as threatening and exceeding his or her resources (Gustafsson, et al., 2002). Resources may include social support of family, friends, and co-workers (Lam, et al., 2011), effective coping strategies (Desmond, 2007), compulsive personality (Chin, Lonner, Jupiter, & Jupiter, 1999), and strong desire to return to work (Chin, et al., 1999; Haese, 1985).
8.4.2.3 Consequences of psychological distress

Outcomes or consequences are those events that occur as a result of psychological distress. The consequences of psychological distress were uniformly negative. Although reaching out to others for help, thereby potentially strengthening social bonds, could be perceived as a positive consequence of distress, Gustafsson (2000) noted that nearly half of the participants in her study of sources of stress found that depending on others for help created distress. Most authors argued that treatment of psychological distress may help to optimize overall treatment outcomes (Chaudhury, 2009; Hennigar, et al., 2001). Untreated psychological distress has been shown to have an impact on the “life situation” outside of the treatment facility (Gustafsson & Ahlstrom, 2004) and interfere with return to work, leading to increased time off work (Clay, et al., 2010; Hennigar, et al., 2001; Tocco, et al., 2011). Psychological distress may also result in increased pain severity and frequency of pain (Clay, et al., 2010). Some authors concluded that psychological distress impacted the course of medical treatment. For instance, those with psychological distress may be considered more difficult to work with or more “resistant to treatment” (Lam et al., 2011, p. 785) while untreated distress may “jeopardize plans for ongoing fracture treatment” (Chaudhury, 2009)(p. 23) or impede progress in rehabilitation (Hannah, 2011). Hannah (2011) suggested that family members may begin to notice behaviour changes in those suffering from psychological distress, which may lead to increased stress for patients and their families. Finally, some authors suggested that untreated psychological distress may lead to the risk of developing mental disorders (Lam, et al., 2011) or long-term psychological difficulties (Meyer, 2003).

8.4.2.4 Definition of psychological distress

The attributes of psychological distress identified within the body of literature related to upper limb injuries led to my development of the following definition of psychological distress in this specific context:

Psychological distress is a troubling psychological state precipitated by a traumatic upper limb injury that consists of measurable symptoms of psychological disorders, presents along a continuum of severity from mild
to severe, and has negative consequences for mental health and recovery from injury.

8.5 Implications of findings for research and clinical use

This concept analysis has several implications for research and for those involved in the clinical care of individuals following traumatic upper limb injuries. First, the term psychological distress is used inconsistently in healthcare literature and researchers may use the term to mean different things. Reserving the use of the term to refer to an independent concept of psychological distress would help to clarify its meaning. In particular, if authors referred to the specific components of distress measured in their studies instead of using psychological distress as a categorical label to refer to a large collection of diagnostic psychological phenomena, it would make comparisons between studies of psychological distress (and the components of psychological distress) more meaningful. In keeping with this, the relative immaturity of the concept of psychological distress in the literature presented in this concept analysis suggests that further development is required in order to make psychological distress useful as an independent concept.

The variable use of the term psychological distress also has implications for communication among clinical colleagues. If clinicians are clear in the way they are using the term psychological distress, this may help ensure of members of the healthcare team communicate effectively amongst themselves and with patients. In particular, clinicians should be aware of the tendency for some authors to use the term psychological distress to be synonymous with symptoms of PTSD; if these symptoms are not present and clinicians are simply referring to a non-pathological, global, negative emotional state, it is important to state this clearly. The definition of psychological distress as symptoms of various psychological disorders produced by this analysis presents a problem for this type of clear discussion and for the concept of psychological distress as an independent concept (see Discussion below). The development of psychological distress as an independent concept that encapsulates this global emotional reaction to injury (and differentiates it from related concepts) would provide clarity in these discussions.
The results of this analysis also highlight three issues relating to psychological distress that may not be familiar to clinicians. Most clinicians would recognise that psychological distress is a negative emotional state and would agree that it is a reaction to injury. However, the general perception in the research that distress is something that patients have control over or that may be influenced through a variety of interventions may not be familiar to hand therapists. From my own practice as a clinician, this is not a message that was clear in training nor is it a view that is shared by many of my colleagues (from personal communications). Education regarding the potential interventions for psychological distress following traumatic upper limb injuries would be useful for hand therapists and others who work with this population. In addition, it would be beneficial for clinicians to recognise the social stigma associated with the expression of psychological distress and be aware that various socioeconomic factors may influence the willingness of participants to express feelings of distress. Finally, the potential for psychological distress to develop into more serious psychological disorders as asserted by several authors in this review implies that more regular screening for psychological distress following traumatic upper limb injuries in clinical settings may be warranted.

8.6 Discussion

The purposes of this concept analysis were to describe the current use of the term psychological distress within the literature related to traumatic upper limb injury and to explore psychological distress as an independent concept in this specific context. Results suggested that these two purposes were somewhat in conflict with one another because psychological distress was so rarely used as an independent concept. The primary finding of this concept analysis was that psychological distress within the traumatic upper limb literature is an immature concept (see Chapter 7). This is evidenced by the use of the term psychological distress as a categorical label instead of a concept in 19 of the 23 articles included in this analysis. Moreover, the concepts included within the category labelled psychological distress varied considerably by author. The inclusion of such a wide variety of concepts within the domain of psychological distress and the four articles that portray psychological distress as an independent concept signify that a global concept of psychological distress does exist. However, the immaturity of this concept and the lack of available measurement tools to capture it impel researchers to focus on various collections of related concepts rather
than one form of global distress that adequately captures the psychological reaction to injury these authors are seeking to describe. My main focus was therefore to provide an introductory overview of how an independent concept of post-injury psychological distress may be conceptualised.

Results of Part I: Psychological distress as a category or a concept?

Psychological distress is rarely presented as a stand-alone concept and is instead used as a categorical label to encompass a range of negative emotions and symptoms of psychological disorders following traumatic upper limb injury. In contrast to a concept, which provides a rich and complex understanding of a particular phenomenon, a category is simply a repository for similar data (Morse, et al., 1996). This conclusion is based upon the fact that, despite widespread use of the term, most authors did not clearly define what they meant by psychological distress, instead referring to the presenting symptoms that they had selected to measure. Psychological distress was presented as a categorical label in one of 3 ways. While some authors used psychological distress to refer to any psychological symptom measured in the study, others used it to refer to a specific combination of symptoms. A third group employed psychological distress as a synonym for symptoms of PTSD. The wide variety of concepts included under this categorical label and its varied use as a category make it difficult to draw any comparisons between studies about the impact of psychological distress on recovery from traumatic upper limb injuries.

One of the problems with measuring psychological distress as a collection of symptoms is that it presents a reductionistic view of distress. Measuring the expression of psychological distress as a series of symptoms taken out of context to the inciting event ignores the contention that psychological distress is a reactionary emotion. While it is true that psychological distress may present as symptoms of worry or bother, questioning individuals about their general state of worry may elicit a different response than questioning them about worry relating directly to a specific stressor. There are exceptions to this within the literature on upper limb injuries. For instance, the Impact of Event Scale (IES) asks respondents to respond to questions relating to cognitive responses or feelings about “it” (Horowitz, et al., 1979). However, the questions refer to “it” as a singular event. It is possible that psychological distress
associated with upper limb injuries is more about the accumulated distress that comes from a number of smaller associated stressors related to the entire recovery experience (i.e. loss of independence, inability to dress, pain, loss of values roles), not just the event of injury itself.

The disagreement about which related concepts to include within a category of psychological distress begs the question – why do researchers continue to use the term instead of just studying the individual components of psychological distress? Part of the explanation for why researchers continue to use psychological distress as an umbrella concept might be in the overlap of symptoms of some of the psychological phenomenon measured together under this term. As a case in point, Gustafsson found such a strong correlation between anxiety and depression in her results that she combined the two variables in her analysis as a “mood disorder” (Gustafsson, et al., 2003)(p. 336). This correlation is also reflected by the DSM-5 criteria for mixed anxiety and depression (American Psychiatric Association, 2013). There are other combinations of psychological phenomena that commonly occur together in certain situations; in these cases, it is convenient to refer to them collectively as psychological distress. For instance, Victorson, et al. (2008) argue that the most common psychological sequelae following traumatic injury are symptoms of posttraumatic stress, depression, anxiety and pain. He refers to symptoms from this combination of psychological phenomena as injury-related distress. In measuring these disparate combinations of psychological phenomena, it is possible that researchers are trying to describe a more global psychological reaction but are limited by the lack of a clear definition of a global concept and by the current available measurement tools.

Four groups of authors within this concept analysis defined psychological distress as an independent concept within their studies (Gustafsson, et al., 2002; Koestler, 2010; Lam, et al., 2011; Moseley, 2004). It is possible that the designs of two of these studies influenced their portrayal of psychological distress. For instance, one study was a qualitative study (Gustafsson, et al., 2002) and another was a review article of psychological reactions to hand injuries (Koestler, 2010); these two research designs allow authors to draw conclusions that are not restricted by currently available measurement tools in defining distress. Psychological distress was also defined as a global psychological reaction to injury by Lam, et al. (2011). However, these authors
went on to measure and report psychological distress as symptoms of PTSD instead of as a unique, independent concept. The final study makes only a brief mention of psychological distress without reference to related concepts (Moseley, 2004). This paucity of information leads to the conclusion that psychological distress is an immature concept following traumatic upper limb injuries and requires development to be useful.

Results Part II: Psychological distress as an independent concept in the traumatic upper limb literature

The second part of this analysis attempted to explore psychological distress following traumatic upper limb injury as a unique concept. Although most authors of articles in this analysis used psychological distress as a categorical label, analysis was undertaken in this section with the aim of establishing possible antecedents, attributes, consequences and related concepts for psychological distress following traumatic upper limb injuries when viewed as a unique concept. The resulting description of the components of psychological distress provides a rich description of psychological distress as a global concept following traumatic upper limb injuries.

The analysis identified nine attributes of psychological distress following traumatic upper limb injuries. Psychological distress: 1) is troubling for the individual, 2) is a reaction to injury, 3) is a dysfunctional psychological state, 4) is comprised of symptoms of pathological psychological diagnoses, 5) presents along a continuum of severity with a threshold for problematic levels, 6) is a phenomenon that can be recognised and articulated by those experiencing it, 7) is a manageable condition, 8) is associated with social stigma, and 9) results in negative consequences. These attributes reflect the current portrayal of psychological distress in the post-upper limb injury literature. As described below, the inclusion of #4 (is comprised of symptoms of pathological psychological diagnoses) is reflective of the current literature and points to a need for the development of the concept. The assertion that psychological distress is a dysfunctional psychological state (#3) implies pathology and is therefore also in some conflict with the stance of most authors and clinicians that distress is not unexpected soon after injury given the primacy of the hand in everyday use and communication (Meyer, 2003). In fact, some degree of distress relating to the injury might be useful in
the early days after injury as it suggests that patients may have a good comprehension of the severity and implications of their injury (Chan, et al., 2009). Some authors proposed that psychological distress becomes a pathological reaction after a set period of time (three months) (Gustafsson & Ahlstrom, 2004; Hannah, 2011). This attribute may need further exploration to determine its application within different timeframes to a global form of psychological. Despite these limitations, the remaining attributes appear to describe a global form of non-pathological psychological distress.

The attributes, antecedents, and consequences identified in this analysis also reflect the distress I have observed in my patients in the hand clinic. In particular, the emphasis on distress as a reaction to injury that presents along a continuum, is associated with social stigma, and is troubling for the individual ring true. Issues with social stigma and willingness to discuss psychological reactions have also been raised by patients I have approached the topic with. In her literature review of psychological adjustment following hand injuries, Hannah (2011) mentions issues of social stigma and comfort when discussing psychosocial issues as barriers to recovery from hand injury. She discusses strategies that hand therapists may use to address psychological reactions including: 1) encouraging patients to take an active role in their therapy, 2) facilitating referral to family physicians, psychologists, psychiatrists or hand injury support groups to address persistent psychological symptoms, 3) observing physical postures to identify avoidant coping strategies and encouraging adaptive coping strategies, 4) facilitating participation in meaningful activity and 5) identifying meaningful functional goals for patients. Most importantly, Hannah notes that simply allowing patients an opportunity to express their distress relating to recovering from their injury may help to decrease anxiety (Hannah, 2011).

Based upon the results of this analysis, psychological distress was defined as:

A troubling psychological state precipitated by a traumatic upper limb injury that consists of measurable symptoms of psychological disorders, presents along a continuum of severity from mild to severe, and has negative consequences for mental health and recovery from injury.

While this definition reflects the findings of the analysis (See Attributes), there is a significant problem with this definition in moving forward with an independent concept
of psychological distress. As most of the articles included in this analysis utilised psychological distress as a label for a category made up of symptoms of a variety of psychological disorders, this definition places a heavy emphasis on these symptoms. This creates a bit of a circular relationship between the definition of psychological distress and its related concepts as it requires the measurement of symptoms of related psychological disorders (established related concepts) in order to measure the independent concept of psychological distress. In order to establish psychological distress as a concept that is independent from its related concepts, it is necessary to define psychological distress without reference to the symptoms of related psychological disorders. Unfortunately, the current presentation of psychological distress in the literature does not allow this. Further development is necessary in order to define psychological distress in this context without reference to related concepts.

The reliance on symptoms of related disorders in defining psychological distress also reflects a reductionistic approach to distress. One problem with a reductionist viewpoint is that it results in an extension of the portrayal of psychological distress as a form of pathology. Despite many authors’ statements that distress reactions were “normal” reactions to a traumatic event, the language surrounding the description of these reactions and the constructs underpinning the tools used to measure it suggest otherwise (see “Attributes”). Although tools such as the Impact of Event Scale (Horowitz, et al., 1979) are designed to screen for stress reactions, their language mimics the language used to measure pathological conditions such as Post-Traumatic Stress Disorder. While it is important to identify those who may actually be at risk for Post-Traumatic Stress Disorder, reliance on these measures in attempting to identify a more global emotional or non-pathological psychological phenomena such as psychological distress may not be appropriate. For instance, the stigma associated with mental health disorders may limit the expression of distress in some individuals or in some cultures where it is seen as a sign of weakness (Lam, et al., 2011). In the same way in which the biomedical model limits understanding of disease to biological causes, viewing psychological distress as simply a collection of symptoms of disorders (regardless of whether the symptoms themselves are seen as pathological) limits understanding of psychological distress and what healthcare providers can do to address it.
To truly present psychological distress as an expected, non-pathological reaction to injury, a different way to conceptualise distress and to measure it is needed. One alternative is to more closely align psychological distress with the concept of stress than with the psychological disorders with which it is currently aligned. Lazarus and Folkman argue that stress or distress is the result of a cognitive appraisal of a situation as threatening in some way (Lazarus & Folkman, 1984). This appraisal is dependent on the interaction between personal and situational factors. One of the benefits of viewing distress within the conceptual framework of stress is that it allows for exploration of factors that contribute to distress from multiple vantage points – the person, the situation or stressor, and resources that individual brings to the situation (including coping mechanisms, social support, etc.). In identifying these additional factors, healthcare workers may be able to design effective interventions or suggest resources to decrease distress for individuals that are less stigmatized than traditional psychological interventions and are more tailored to the individual.

Within the literature related to upper limb injuries, some authors recognized the limitations of a symptom-based view of distress and attempted to include situational aspects of distress or available resources in their overall measures of emotional well-being. Lam (2011) included a measure of social support in his study of psychological distress following upper and lower limb fractures. However, social support was measured as a separate concept to psychological distress and the authors then evaluated the correlation between these two concepts rather than attempting to combine social support and psychological distress within the same concept (for instance, by phrasing questions so that the social support was a potential source of distress). Gustafsson’s (2000) qualitative study of sources of stress immediately following moderate to severe traumatic upper limb injuries identified a number of aspects of the recovery experience from a traumatic upper limb injury that could contribute to distress. While Gustafsson’s study provides valuable information about the aspects of upper limb injury and recovery that may be stressful following a severe upper limb injury (such as difficulty with daily tasks, boredom, and uncertainty about future function), it is not clear that the same aspects of recovery would be relevant to those with less severe upper limb injuries. Further qualitative research would be helpful to clarify the aspects of injury and recovery that create stress in this population.
This analysis provides a middle-range descriptive conceptualisation of psychological distress within a narrow discipline. There are some limitations to this approach. Firstly, the choice of such a narrow field of research and practice limits this applicability of these findings to a relatively small number of individuals. Within Rodger’s Evolutionary Method, she recommends that this can be overcome by comparing the use of a concept between disciplines or between timeframes (Rodgers, 1989, 1993; Rodgers & Knafl, 2000). Unfortunately, the sample of literature obtained for this study was too small to allow for an analysis of how the term psychological distress has changed over time. The exploration of this concept in a very specific context (post-traumatic upper limb injury research) was deliberate due to my ontological position that the psychological distress experienced by someone recovering from an upper limb injury may be fundamentally different than the psychological distress experienced by someone recovering from other health conditions such as cancer, or even from upper limb pain with a non-traumatic cause. However, additional research that explored the depiction of psychological distress presented in this concept analysis with the presentation of psychological distress in one of these other areas would be helpful.

One of the difficulties in completing the concept analysis was the relative immaturity of this concept in upper limb traumatic injury literature. An immature concept is one that is defined ambiguously and which may be used inconsistently within a particular body of literature or may be used interchangeably with other concepts (Morse, 1995). Because the term psychological distress was used so inconsistently within this literature, it was difficult to provide a deeper level of analysis. For instance, the inclusion of such variable related concepts within the definition of psychological distress made it difficult to compare studies. However, this concept analysis has determined the current state of psychological distress as a stand-alone concept within this research area. Further research is required in order to provide a richer understanding of this concept as it applies to this setting.

8.7 Where to from here in this thesis?

Once I had determined how the concept of “post-injury anxiety” (or psychological distress) fitted within the traumatic upper limb injury literature, my next goal was to develop this independent concept as a non-pathological, emotional reaction to injury. In order to do this, I chose to focus on what Lazarus and Folkman described as situation
factors within their theory. Although they defined a number of formal properties of situations that they felt were relevant to situations in general, they recognized that there could be more properties than the ones they identified in their initial work (Lazarus & Folkman, 1984). And, in fact, Lazarus and Folkman argue that it is important to identify “those properties of situations that make them potentially harmful, dangerous, threatening, or challenging” (p82) in order to adequately evaluate the potential for individuals to appraise those situations as threatening (Lazarus & Folkman, 1984). I felt that there might be specific aspects of the experience of recovering from a traumatic upper limb injury that might be unique to that situation. In order to explore this, I designed a qualitative study in which I completed semi-structured interviews with individuals who had recently experienced a traumatic upper limb injury and asked them to describe aspects of the recovery process that they found stressful or bothersome. This study is reported in Chapter 9.

### 8.8 Chapter Summary

This chapter described the results of a concept analysis of psychological distress within the literature relating to traumatic upper limb injuries. Results indicated that this concept was most often used as a categorical label rather than an independent concept. The components of psychological distress as an independent concept within this particular context including the attributes, antecedents, consequences, and related concepts were described. This information provides a foundation for further research designed to expand and refine the concept of psychological distress within traumatic upper limb injury research and practice.
Chapter 9

Study III: Sources of Distress Following Minor to Moderate Traumatic Upper Limb Injury

9.1 Chapter Overview
This chapter reports a qualitative study exploring the experiences of recovering from a traumatic upper limb injury with a particular focus on the aspects of that experience that the participants described as distressing. I discuss the background and significance of the study, and provide a description of methods used to collect data and complete a thematic analysis (Braun & Clarke, 2006) of the data from interviews with 11 individuals who had recently sustained traumatic upper limb injuries. I present the four main themes and subthemes identified in the data and discuss the clinical and research implications of these findings within the context of the rest of this thesis.

9.2 Background and significance
The previous chapter introduced psychological distress as a unique concept and provided the background literature review for this chapter (see Chapter 8). Based upon the traumatic upper limb literature, I developed an injury-specific definition of psychological distress as: “a troubling psychological state brought on by a traumatic upper limb injury that consists of symptoms of psychological disorders, presents along a continuum of severity from mild to severe, and has negative consequences for mental health and recovery from injury.” However, as described in Chapter 8, this definition provides a problematic description of psychological distress as a unique concept due to its reliance on symptoms of related disorders and its promotion of distress as a pathological condition. If psychological distress is to be useful as a unique concept, further exploration is required.

To determine a direction for this exploration, I started with the limitations of the definition of psychological distress as described above. In particular, while the concept analysis found that psychological distress was considered an expected
reaction to injury, the language used to describe these reactions suggests otherwise; descriptions of distress as a dysfunctional state or a psychological problem were common. Most authors of papers included within the concept analysis measured psychological distress using self-report measures that asked respondents to endorse individual cognitive or behavioural symptoms of anxiety or stress. The emphasis on individual symptoms of anxiety or stress in measuring reaction to injury furthers the view of psychological distress as a pathological condition. Therefore, one of the aims of exploring the concept of psychological distress further was to find a way to portray this distress as an expected reaction to injury.

One alternative to the portrayal of psychological distress as a collection of symptoms is to define psychological distress in relation to the stressors encountered within a particular illness experience. This viewpoint shifts the emphasis from the psychological symptoms exhibited by an individual to the interaction between the individual and the situational demands and reflects Lazarus and Folkman’s theory of stress (Lazarus & Folkman, 1984). According to their theory, stress occurs when an individual appraises a situation as threatening or exceeding his or her resources. This appraisal varies based upon factors that the individual brings to the situation (e.g. personal values, see Chapter 6). However, although each person may appraise aspects of a situation differently depending on these personal factors, Lazarus & Folkman (1984) acknowledged that there are formal properties of situations that may make certain situations, like injury or illness, more likely to be threatening. This view of distress is different from the definition of distress reflected in Chapter 8, which emphasises the symptoms of distress rather than the cause of the distress. In contrast, the view of distress presented by Lazarus and Folkman (1984) acknowledges the role that the stressors in a situation like recovering from a traumatic upper limb injury play in creating distress, placing the psychological distress that may result from these stressors within an understandable context.

In order to develop psychological distress as an independent concept within this framework, it is necessary to have a good understanding of the factors within a particular situation that have the potential to be threatening. Some of these factors have been identified in those with severe hand injuries including appearance of injured limb (Grunert, Devine, Matloub, Sanger, & Yousif, 1988a), sexual dysfunction
(Grunert, Devine, Matloub, Sanger, & Yousif, 1988b), pain, and the trauma experience (Grunert, Devine, et al., 1988a) (See section 3.3.4.2). Additional sources have been identified by two qualitative studies which specifically explored sources of distress following traumatic upper limb injuries (Gustafsson, Persson, & Amilon, 2000; Haese, 1985). Haese (1985) completed a cross-sectional study in which they interviewed 30 acutely hand-injured adults [20 men (mean age = 45.5), 10 women, (mean age = 30.5)] who were recruited from four general hospitals and four outpatient facilities in a major metropolitan industrial community in the United States. Sampling method was not reported. One participant was unemployed, one was a homemaker, and one was retired; the other 27 participants were all employed although occupations were not reported. Eighteen participants were injured at work, eleven at home, and one in a car accident. The aim of this study was to identify psychological aspects of hand injuries requiring sutures to the muscle, tendon or fascia of the hand. Participants were assigned to one of three groups (N = 10 in each group) representing the early, mid-treatment and discharge phases of rehabilitation depending on their phase of recovery. However, the results were analysed largely as one large group. The interviews included open questions as well as rank-ordered data and were analysed using a thematic analysis approach.

Although Haese's (1985) study did not specifically focus on sources of stress, a number of stressors relating to recovery from upper limb injuries were identified (See Table 9.1). Pain, fear of disfigurement, and fear of returning to work where the accident occurred were not stress factors for the participants in this study, possibly due to the less severe nature of the injuries (although specific descriptions of the severity of injury sustained by participants was not included). There are some limitations to this study. First, the restriction of diagnosis specifically to hand injuries requiring surgical repair calls into question to applicability of these results to those with severe or minor (not requiring surgical repair) injuries. In addition, the analysis of the specific sources of distress related to injury was not a major focus of this study. While this study provided some initial data, it provides an incomplete picture of the sources of distress following minor to moderate traumatic upper limb injuries.
Table 9.1: Sources of distress defined in Gustafsson, et al. (2000) and Haese (1985)

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<tr>
<td>Practical problems with daily activities</td>
<td>Physical dysfunction interfering with activity</td>
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<tr>
<td>Uncertainty about function in the future</td>
<td>Desire to return to activity (work, recreation, family care), leadership and responsibility</td>
</tr>
<tr>
<td>Pain</td>
<td>Concern for inactivity</td>
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<tr>
<td>Being dependent on help from others</td>
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<tr>
<td>Involuntary inactivity</td>
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<tr>
<td>The appearance of the hand</td>
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<td>Trauma experience</td>
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Some of the limitations encountered in Haese’s study are addressed in Gustafsson, et al.’s (2000) exploration of sources of distress following severe traumatic hand injuries. In this study, 20 individuals admitted to Örebro Medical Centre Hospital in Sweden with traumatic upper limb injuries 8-20 days (mean = 10 days) post-injury participated in interviews asking them to describe their accident and the timeframe leading up to their first visit to the outpatient surgical clinic. Sampling was purposive with the aim of obtaining a diverse sample relative to age, type of accident, and injury. Their resulting sample was predominately male (N = 19), and injured at work (N = 11) (8 injured at home, 1 at a sporting event). All 20 required inpatient hospitalisation for their injury, suggesting that the severity of injury was moderate to severe (although this was not implicitly stated). Interviews were analysed following the first steps of the modified model of grounded theory (Strauss & Corbin, 1990) with the aim of identifying sources of distress in the early days following moderate to severe hand injuries. Text passages were coded based on content related to sources of stress and were collated into themes. Related themes were eventually brought together to form categories.

The results of these studies confirmed that practical problems and inactivity are sources of distress following both severe (Gustafsson, et al., 2000) and minor to moderate (Haese, 1985) hand injuries. However, Gustafsson, et al. (2000) identified a number of other sources of distress that were not reported by Haese’s participants.
(See Table 9.1). For instance, uncertainty about future function, being dependent on help from others, appearance of the hand, the trauma experience, and pain were all reported in Gustafsson (2000) as sources of distress but were not mentioned by Haese (1985). It is possible that these stress factors were identified by Gustafsson, et. al due to differences between the samples in the two studies. For instance, the participants in Gustafsson, et. al: 1) had sustained more severe injuries, 2) were mostly men (19/20 vs 20/30 in Haese’s study), and 3) were interviewed earlier in the recovery process. It is also possible that Gustafsson et. al’s specific focus on identifying stress factors following injury led them to ask different questions during the interviews. For instance, while Gustafsson (2000) incorporated sources of stress identified in earlier interviews within later interviews, Haese (1985) reports that her interviews were based upon a written interview schedule to provide consistency. Gustafsson et al.’s (2000) study provides rich description of the sources of distress in the early days following moderate to severe hand injuries in men. However, due to the sampling, the results may not provide a comprehensive view of sources of distress for those with more minor injuries or women with hand injuries.

According to Lazarus, the situational factors that have the potential to create distress in individuals vary in different illness situations and during different stages of illness (Lazarus, 1992, 1993). As such, it is important to carefully define the illness situation and the stage of illness (or injury) of interest. This thesis is focused on the presentation of psychological distress during the recovery from minor to moderate upper limb injuries. This situation and timeframe are subtly different than those described in both Haese (1985) and Gustafsson, et al (2000). Therefore, I felt that a study exploring sources of distress in this specific context was warranted.

The main aim of this study was to identify aspects of the recovery experience that were appraised as distressing by individuals who had recently sustained mild to moderate traumatic upper limb injuries. In other words, I was interested in obtaining rich descriptions of how people described the aspects of the experience of recovering from a traumatic upper limb injury that were distressing for them. In order to achieve this, I needed to obtain participants’ perspectives on their individual experiences. The overall purpose of the current study was to identify the ways in which men and women described the situational demands or stressors
associated with the first five months of recovery following mild to moderate traumatic upper limb injuries. The time period of five months was chosen because, in my clinical experience, most individuals with mild to moderate injuries completed their course of rehabilitation within this timeframe.

9.3 Methods

9.3.1 Study design
This qualitative study employed the thematic analysis approach described by Braun and Clarke (Braun & Clarke, 2006). Thematic analysis provides a flexible foundation for a general qualitative research inquiry with a focus on generating in-depth knowledge about the data (Braun & Clarke, 2006). Because thematic analysis is not necessarily driven by any explicit philosophic assumptions, it allows flexibility for researchers to employ methods that are appropriate for their study (Braun & Clarke, 2006). This approach fits well within the pragmatic worldview to research underlying this thesis.

Approaching the topic of traumatic upper limb injuries from a qualitative viewpoint provided insight into participants’ perspectives regarding the sources of distress, reflecting the personal and individual nature of the appraisal process. Adopting a face to face, semi-structured interview format allowed me to obtain rich and detailed descriptions from participants about their experiences and increased the potential for identifying new stress factors that had not been considered in previous publications (Britten, 1995). Because the interviews involved discussion of some potentially sensitive topics including issues related to relationships, emotional reactions, and stressful situations or events, the privacy of individual interviews also encouraged participants to talk more freely than they might have in a group setting. Purposive sampling was employed to get a maximum variation sample (in terms of gender, age, occupation, and type of injury) in order to obtain multiple perspectives on aspects of recovery that were distressing (Marshall, 1996) (see section 9.3.2, Participants and recruitment).

9.3.2 Participants and recruitment
Participants were recruited through the Outpatient Physiotherapy Department and Outpatient Fracture Clinic of Dunedin Hospital. The inclusion/exclusion criteria
were designed to result in a sample representative of a typical outpatient clinic and contained the following:

Inclusion criteria:

1) > 18 years of age
2) Sustained traumatic upper limb injury < 5 months prior to recruitment
3) Currently enrolled in outpatient rehabilitation (or recently completed course of rehabilitation)
4) Able to communicate in English

Exclusion criteria:

1) Cause of upper limb pain due to disease process or repetitive strain
2) History of diagnosed mental illness (e.g. post-traumatic stress disorder, generalised anxiety disorder)
3) Trauma had resulted in severe injuries to multiple limbs or body structures (other than in the affected limb) at the same time as the relevant injury

Potential participants were identified by hand therapy/nursing staff in these locations. I then mailed a study packet (including an information sheet for participants, a return postcard, and a stamped envelope addressed to myself at the University of Otago, Department of Psychology) to each potential participant (See Appendix D). Participants were requested to return the postcard (in the self-addressed, stamped envelope provided) indicating if they were interested in participating in the study. A total of 70 study packets were sent out between April 2012 and June 2012 with 26 postcards returned, 20 of which were from individuals who expressed interest in participating. Sampling was purposive with the goal of creating a diverse sample relative to gender, age, type of employment, and type of injury. The first individual who returned a postcards and met the study criteria and was contacted by telephone to explain the study, obtain verbal consent, and schedule an interview. Subsequent interviews were scheduled in order to obtain a diverse sample based upon these criteria following initial phone contact to confirm this information. Coincidentally, the first 11 individuals who returned postcards and met study criteria ended up comprising such a diverse sample and were included in
the study. Each interview was transcribed and analysed as the study progressed (See Section 9.3.5 for data analysis). Following the first 11 interviews, replication of emerging themes between participants was evident, the data contained multiple examples to support each theme, and I felt I had obtained a diverse sample. Therefore, I did not contact the remaining nine individuals who had expressed interest in participating. The resulting sample consisted of 11 people (7 men, 4 women) with an age range from 21-76 (See Table 9.2 for participant demographics). All interviews were completed between April 18, 2012 and June 1, 2012. All participants provided written informed consent. This study was approved by the Lower South Regional Ethics Committee (LRS/12/EXP/003) and the Health Research Office of the Dunedin School of Medicine and Southern District Health Board (Project# 00781). Māori consultation was undertaken via the Ngāi Tahu Research Consultation Committee at the University of Otago.

9.3.3 Interviews
Participants completed one face-to-face, semi-structured interview intended to explore their experiences of sustaining and recovering from a traumatic upper limb injury. In deference to the potential for interviews to include sensitive topics, participants were invited to bring a support person to the interview (interviewees 4 and 9 both chose to have their spouse present for the interview). Participants were informed that they could end the interview at any time with no negative consequences to them and were given a choice of venue for the interview. I was the interviewer for all of the interviews. My training for conducting these interviews included my formal degree in Occupational Therapy and my experience evaluating patients as a clinical hand therapist. Questions on the interview schedule were prepared in advance and were discussed with supervisors. A practice interview with supervisors was completed prior to the first participant interview. Eight of the interviews took place in an interview room at the University of Otago with the remaining three interviews conducted in participants’ homes. In order to ensure my
### Table 9.2: Socio-demographic information for participants at time of interview

<table>
<thead>
<tr>
<th>Interview</th>
<th>Age</th>
<th>Interview length</th>
<th>Gender</th>
<th>Living situation</th>
<th>Employment</th>
<th>Surgery (Y/N)</th>
<th>Type of injury</th>
<th>Approximate time since injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>76</td>
<td>26:33</td>
<td>Male</td>
<td>Alone</td>
<td>N/A – Retired</td>
<td>N</td>
<td>Proximal phalanx fracture</td>
<td>6 weeks</td>
</tr>
<tr>
<td>2</td>
<td>58</td>
<td>54:24</td>
<td>Female</td>
<td>Spouse</td>
<td>Healthcare professional</td>
<td>N</td>
<td>Metacarpal fracture/extensor tendon abrasion</td>
<td>4 months</td>
</tr>
<tr>
<td>3</td>
<td>21</td>
<td>27:18</td>
<td>Female</td>
<td>Flatmates (supportive boyfriend)</td>
<td>Fitness professional</td>
<td>Y</td>
<td>Flexor tendon laceration (Zone II)</td>
<td>9 weeks</td>
</tr>
<tr>
<td>4 *</td>
<td>61</td>
<td>90:19</td>
<td>Female</td>
<td>Spouse</td>
<td>N/A – Retired</td>
<td>Y</td>
<td>Left distal radius fracture/Right “elbow” fracture + dislocation</td>
<td>4 weeks</td>
</tr>
<tr>
<td>5</td>
<td>Unknown</td>
<td>57.24</td>
<td>Male</td>
<td>Spouse</td>
<td>Public service</td>
<td>N</td>
<td>Proximal phalanx fracture</td>
<td>4 months</td>
</tr>
</tbody>
</table>
Table 9.2: Socio-demographic information for participants at time of interview

<table>
<thead>
<tr>
<th>Interview</th>
<th>Age</th>
<th>Interview length</th>
<th>Gender</th>
<th>Living situation</th>
<th>Employment</th>
<th>Surgery (Y/N)</th>
<th>Type of injury</th>
<th>Approximate time since injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>42</td>
<td>54:05</td>
<td>Male</td>
<td>Spouse/family</td>
<td>Public service</td>
<td>Y</td>
<td>Thumb amputation</td>
<td>3 months</td>
</tr>
<tr>
<td>7</td>
<td>48</td>
<td>56.26</td>
<td>Male</td>
<td>Unknown</td>
<td>Healthcare professional</td>
<td>Y</td>
<td>Volar plate avulsion fracture</td>
<td>6 months**</td>
</tr>
<tr>
<td>8</td>
<td>39</td>
<td>43:03</td>
<td>Male</td>
<td>Spouse/family</td>
<td>Truck driver/delivery person</td>
<td>Y</td>
<td>Bilateral scapholunate ligament tears</td>
<td>5 months</td>
</tr>
<tr>
<td>9*</td>
<td>71</td>
<td>47:01</td>
<td>Male</td>
<td>Spouse</td>
<td>N/A – Retired</td>
<td>N</td>
<td>Distal radius fracture</td>
<td>5 months</td>
</tr>
<tr>
<td>10</td>
<td>66</td>
<td>63:19</td>
<td>Male</td>
<td>Spouse</td>
<td>N/A – Retired</td>
<td>Y</td>
<td>Extensor tendon laceration</td>
<td>5 months</td>
</tr>
<tr>
<td>11</td>
<td>21</td>
<td>63:15</td>
<td>Female</td>
<td>Flatmates</td>
<td>Support worker</td>
<td>Y</td>
<td>Extensor tendon laceration</td>
<td>6 months**</td>
</tr>
</tbody>
</table>

* = Spouse present at interview; ** = Note that two patients had sustained injury at just over 6 months by the time of scheduled interview (both met the 5 months since injury requirement at time of initial contact)
safety in those interviews conducted in participants’ homes, I ensured one of my supervisors was aware of my location and I contacted that supervisor immediately at the end of the interview. The study was explained to participants and written consent was obtained prior to the start of the interview. I informed participants that I was both a researcher and a hand therapist and that the study was being conducted as part of my PhD study. Participants were given a chance to ask questions about the study at this time and at the end of the interview.

I developed the interview guide based upon my experience as a hand therapist, the results of Study I (See Chapter 5), and the sources of distress that were identified in those with severe hand injuries by Gustafsson, et al. (2000) (See Appendix D). Questions were designed to encourage participants to talk about each aspect of their injury experience and recovery. Interviews loosely followed the sequence of events starting with injury and proceeding to recovery in order to encourage easier flow of conversation. I began each interview by asking participants to describe the accident, the immediate aftermath of the injury, and the treatment of the injury. I then asked participants to describe how the injury had impacted their daily lives, their work roles (if applicable), and their relationships. I ended by showing participants a table (See Appendix D) with photos and descriptions of aspects of recovery from a traumatic injury that other people had identified as creating distress. This chart was based upon the RRAQ and previous research (Grunert, Devine, et al., 1988a, 1988b; Gustafsson, et al., 2000). Themes or topics that were brought up in earlier interviews were incorporated into later interviews at this point in the interview. The order of the questions on the schedule varied somewhat during each interview depending on how the participant chose to describe his or her experience. Open-ended questions were designed to encourage participants to describe events based upon their own experiences, but anonymised examples were given from previous interviews if participants required prompting. Other standard prompts, such as ‘Can you tell me more?’, ‘How did you feel about that?’, and ‘Where were you?’ were used as needed. I ended each interview by asking the participant if they had any additional information to share, and what advice they would give someone who had an injury like theirs. The interview guide was reviewed by both supervisors and by a hand therapy professional to ensure
the relevance of each question to the topic. Interviews lasted between 26 and 90 minutes (average = 53 minutes). I digitally recorded all interviews with participants' consent. As indicated in the cover letter, all participants received a $50 grocery voucher as reimbursement for any expenses related to their participation.

### 9.3.4 Data management

Digital recordings of interviews were transcribed verbatim in a rolling fashion following completion of each interview. I transcribed the first interview in order to establish transcription conventions; subsequent interviews were then transcribed verbatim following these conventions (and the standard conventions used by the service) by a company that has an ongoing confidentiality agreement with the University of Otago (See Table 9.3).

### Table 9.3: Transcription conventions used in Study III

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>___</td>
<td>Unable to hear a word (3 underscores)</td>
</tr>
<tr>
<td>..</td>
<td>Pause or interruption in speech (mid sentence) OR unfinished sentence</td>
</tr>
<tr>
<td>??word??</td>
<td>Not sure if word is spelt correctly</td>
</tr>
<tr>
<td>[note]</td>
<td>Text which is not part of the transcript is put in square brackets, e.g. notes about sound quality, laughter</td>
</tr>
<tr>
<td>[pause]</td>
<td>Significant or long pause</td>
</tr>
<tr>
<td>Interviewer:</td>
<td>Identifies speech belonging to interview</td>
</tr>
<tr>
<td>Participant</td>
<td>Identifies speech belonging to participant</td>
</tr>
</tbody>
</table>

Adapted from Document Doctor, Transcription & Formatting Service (standard conventions)
Pseudonyms were used for each participant and identifying information (such as family members' names) was removed in order to protect participant confidentiality. Transcripts were then loaded into QSR International's NVivo 8 Software (2008) for analysis. I entered demographic information from the consent form (including name of participant, pseudonym, and contact information) into a password-protected Excel spreadsheet. A separate Excel spreadsheet contained the remaining demographic information (including work status, gender, surgery required, whether in jury was work-related injury, diagnosis, estimated injury severity level, and type of work) listed by pseudonym was created from information supplied during the interviews. All files were stored on a password protected computer.

9.3.5 Data analysis

Data analysis followed the steps laid out by Braun and Clarke in their treatise on thematic analysis (Braun & Clarke, 2006). Analysis was inductive and content-based, meaning that I actively developed the themes from the data (data-driven) rather than approaching the data with preconceived themes. However, I did have a coding focus; I coded any sections of the transcript that described sources of psychological distress related to the recovery from injury. This could be stated directly by the participant or could be implied by the language the participant was using (see below). I chose to do this in order to allow the views of participants to drive the data analysis rather than my own experiences or the results of previous research. Braun & Clarke propose six phases to thematic analysis: 1) familiarise yourself with the data, 2) generate initial codes, 3) search for themes, 4) review themes, 5) define and name themes, and 6) produce the report (Braun & Clarke, 2006).

I first read through each transcript as it arrived from the transcription service with the audio recording to check for errors and to familiarise myself with the interview as a whole. I then read through each transcript again once loaded into NVivo software to identify initial codes, which identify a feature of the data that is interesting or represents information that appears to refer to a “basic element” of
the raw data (Braun & Clarke, 2006). In this study, initial codes included any aspect (including specific events, relationships, emotions, thoughts, or communications) of the experience of sustaining and recovering from a traumatic upper limb injury that participants described as distressing. Indicators of distress included both verbal (e.g. inclusion of words such as distressing or phrases such as ‘that was hard’) and non-verbal cues (such tearful affect) when noted in transcript or apparent from the language in the transcript. Using these initial codes, I organised a table that included my reaction to each code and representative quotes from multiple participants to facilitate discussion of results with supervisors (EJCHS, GT). In order to provide a picture of the strength of each code, I included a count of the number of quotes in each code, the number of participants who talked about the code, and a general interpretation of that that code. Some quotations were included in more than one code if relevant. The information in this table was then reviewed for clarity by my supervisors (EJCHS and GT) (both of whom are experienced in qualitative research), who had not read the transcripts so approached the analysis with ‘fresh eyes.’

The second layer of analysis involved ascertaining any overlap between the codes and determining whether there was enough data from more than one person to justify a theme or subtheme. At this level, some codes were combined through discussion with EJCHS and GT in order to avoid repetitiveness or because there were not enough instances of the code to justify separating it from a related code. This layer of analysis was congruent with step four, reviewing themes, described by Braun & Clarke (2006).

At the third layer of analysis, the codes were combined and named at a more abstract level to form four overarching themes, each with a number of subthemes and corresponding to step five in Braun and Clarke (2006). I documented detailed interpretations of the themes and selected relevant quotations that clearly
illustrated the main ideas of each theme and subtheme. Further discussions with the supervisors helped to determine which codes were relevant to which themes. This level of analysis went through several iterations before the final main themes and subthemes were settled. By the final iteration, all data were coded and all codes were either included within a theme or subtheme or had been combined with other codes due to overlapping meanings. These themes were reviewed again with EJCHS and GT to confirm that each theme represented a distinct idea, that subthemes were relevant to the main themes and did not overlap with other themes, and that the themes represented the data set as a whole (Braun & Clarke, 2006). A number of general ideas running through the data were identified as ‘cross-cuts’ which appeared in more than one theme (see section 9.5, Appendix F). Themes were also validated by informally discussing the findings with professionals within the field of hand therapy.

This multi-layered approach to the data analysis helped to ensure that the results demonstrate trustworthiness and are of a high quality (Yardley, 2000). In addition to transparency in reporting both the design of the study and the procedures for coding, I made a conscious effort to follow recommendations of the COREQ checklist for quality assurance in qualitative enquiry (Tong, Sainsbury, & Craig, 2007) (see Appendix G). For instance, in the domain of Research Team and Reflexivity, I attempted remain aware of my background knowledge and viewpoints as a practicing hand therapist during the analysis and during the interviews. In particular, I introduced myself to each participant as a researcher and acknowledged my background as a hand therapist. I kept a research journal detailing my initial reactions to each interview and general impressions of each participant. Data from this journal informed the coding process but was not included in coding or during the final analysis. In addition, I documented my

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1 I did not attribute any quotes directly to individual participants. I chose to do this for two reasons: 1) to protect the confidentiality of participants and 2) to avoid the association of irrelevant demographic information with the themes. As I do not attempt to associate the themes with any subgrouping of demographic information, I did not feel it was relevant to attribute specific quotations to individuals. Instead, the quotes were chosen to illustrate a specific theme that was representative of multiple viewpoints in the interviews. This approach is supported by journals that publish qualitative health research such as Qualitative Health Research (see author instructions) and has been encouraged by Morse (Morse, 2008; Morse & Coulehan, 2015). I included the demographic information in table form to give the reader an overview of the study sample.
observations about sources of distress following upper limb injuries based upon my experiences as a hand therapist prior to initiating interviews with participants in order to make myself aware of my existing viewpoints. This helped to ensure that my coding of the interviews represented the views of the participants and not my own expectations. Step 6 in Braun & Clarke (2006), producing a report, is represented by this chapter.

9.4 Results

I identified four main themes in the analysis of sources of psychological distress following traumatic upper limb injuries including: 1) Uncertainty, 2) Disruption, 3) Identity, and 4) Legitimacy (See Table 9.4).²

<table>
<thead>
<tr>
<th>Main Theme</th>
<th>Includes distress related to…</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncertainty</td>
<td>Distress related to the unknown and unfamiliar aspects of recovering from a traumatic injury</td>
</tr>
<tr>
<td>Disruption</td>
<td>Distress relating to an interruption or forced change to established routines or “normal” activities</td>
</tr>
<tr>
<td>Identity</td>
<td>Distress relating to the influence that upper limb injuries had in shaping how participants felt about themselves as family members, co-workers, functioning members of society, and as healthy, vital human beings</td>
</tr>
<tr>
<td>Legitimacy</td>
<td>Distress surrounding the legitimacy of the injury, both in terms of participants’ own views of the legitimacy of their injury and the legitimacy that others attributed to their injury</td>
</tr>
</tbody>
</table>

9.4.1 Theme 1: Uncertainty

This theme encompasses distress related to the unknown and unfamiliar aspects of recovering from a traumatic injury. One participant captured this overarching

² In cases where quotes have been edited for clarity in this chapter, [ ] are used around the content that has been edited. I have also used .. in the middle of a sentence if the quote has been shortened for brevity.
concern about current and future care: “I think obviously once I was at [the emergency department] and they said it was broken it sort of I suppose confirmed my worst fears really. I thought oh god you know what are they going to do now sort of thing.” The unknown and unfamiliar aspects of the injury, recovery, interactions with the healthcare system and future implications of the injury are detailed in five subthemes below: 1) Limited understanding of injury and process, 2) Trust in healthcare system, 3) Poor communication with healthcare workers, 4) Understanding and impact of pain, and 5) Uncertain future function.

Uncertainty subtheme 1: Limited understanding of injury and process

Arguably the core of this theme involved distress brought about by a lack of understanding of the medical and rehabilitation issues related to the injury. As most of the participants did not work within a healthcare field and had limited experience with prior injuries, many of the frustrations expressed by these individuals were related to a lack of knowledge about the medical or procedural [e.g. how to report their injury to the Accident Compensation Corporation (ACC)] aspects of their injuries. For instance, a basic lack of understanding of the pathomechanics and healing processes related to injury in the upper limb led to confusion and distress because they had no frame of reference for understanding what was going on inside the injured upper limb. This misunderstanding was often manifested in comments about longer than expected timeframes for healing and fear or frustration about whether they should be using the injured limb during activity.

Although participants all reported that healthcare workers had provided them with information about their injuries, most expressed some level of doubt related to their understanding of the structures damaged and the healing processes involved. This was particularly true for those patients who had not undergone surgery and had no outwardly visible signs of injury. This lack of knowledge also appeared to apply to the rehabilitation process following injuries. For instances, while some participants had preconceived ideas about what treatment would entail and how long it would take, many of the participants expressed surprise at the extent of rehabilitation and the slowness of the healing process. In particular,
many reported surprise and dismay at the stiffness and weakness in their limb when the cast or splint was first removed:

_I didn’t really understand the extent of it... I thought it would be a broken arm. You’re in a cast for six weeks, you take it off and you’re like oh yea, my hands work now, all good. But it definitely wasn’t that easy...I didn’t understand there would be so much physio and like it would be so slow._

Although this lack of knowledge created distress for some, one participant was perfectly happy with the limited information she had about her injury and was happy to trust the medical system to manage her care. This attitude seemed to stem from a fear that the information she did not have would be negative news and would prevent her from maintaining a positive outlook on recovery.

Uncertainty was also an issue in dealing with the services designed to support those recovering from traumatic injury. Within New Zealand, the Accident Compensation Corporation (ACC) is responsible for providing financial coverage for medical services (including rehabilitation), partial payment of lost wages, and support services for those who qualify following an accidental injury. Claims to ACC are generally filed by the healthcare professional who provides initial treatment for the injury. However, the processes involved in this system can be complex and require that paperwork be sorted correctly for the approved benefits to be processed. For some participants, unfamiliarity with the system and with the paperwork required to claim benefits resulted in distress. For instance, several of the participants reported that they were unfamiliar with the processes required by the Accident Compensation Corporation (ACC) to lodge a claim for medical coverage of their injury or with the benefits they were entitled to through ACC.

**Uncertainty subtheme 2: Trust in healthcare system**

Uncertainty related to level of trust in the healthcare system was also an issue. While some were happy to trust their healthcare providers to provide the best possible care, others displayed a wariness of both their care providers’ competency and the effectiveness of the healthcare system in general. This divide was most evident between those who had some familiarity with the healthcare
system (i.e. a family member who worked in the hospital or related healthcare area) and those who did not. For instance, participants who were more familiar with the healthcare system reported increased distress if they were not familiar with the care provider who would be treating their injury. These participants tended to use their connections to obtain medical advice outside of the normal system procedures (i.e. in a casual meeting in the hallway) or to influence who their care provider would be. This level of control over their care appeared to alleviate their distress.

All participants reported that trust in the healthcare system was important when recovering from an injury. For instance, when asked what advice participants might give someone going through the same recovery as they did, most responses included mention of trusting the healthcare providers responsible for their care.

**Uncertainty subtheme 3: Poor communication with healthcare workers**

Although participants valued trust in their healthcare providers, uncertainty related to poor understanding of injury and reimbursement was often created or exacerbated by poor communication between participants and healthcare workers. In particular, the common use of medical jargon by healthcare workers when explaining things to patients was a source of frustration:

> I suppose doctors are probably not as bad as they used to be. I mean they’re aware that patients need to try and, need to understand things. They have to bring it down to their levels and...but yeah, often they just talk in this sort of gobbledy gook basically and you’re thinking what the hell does that mean.

Communication with healthcare workers also contributed to uncertainty about the legitimacy of participants’ experiences. For instance, communication that was interpreted as lacking in empathy or understanding contributed to a feeling that the doctor/healthcare professional did not value and was not responding appropriately to a patient’s concerns. This created distress by leading participants to question their interpretation of the physical sensations they were experiencing and added uncertainty regarding the quality of care they were receiving. Conversely, establishing good communication between interested parties helped
to alleviate distress. In particular, being involved in conversations between employers and healthcare workers or case managers appeared to ease distress considerably as it alleviated some of the mystery about which parties had been given what information.

**Uncertainty subtheme 4: Understanding and impact of pain**

Nine of the participants discussed issues related to pain (two participants reported that pain was not a source of distress). Early post-injury, pain was associated with specific things like going to therapy or being able to complete work tasks. Although most participants reported that they had experienced pain as part of their injury and recovery, reactions to pain varied. The pain itself was a source of distress for some participants, as it tended to distract them from other things in their lives. Other participants reported that they expected pain as part of the healing process and managed the pain with medication. For both of these groups, pain was a predictable event early in the recovery process. However, as healing progressed, the pain became more difficult to predict and, therefore, became more distressing. For instance, one participant found the relationship between activity and delayed pain and stiffness distressing as it made it difficult to predict when her pain would occur with accuracy:

>You know you have a good day or a good couple of days where you’ve got no pain and you do a few things, you peel a pot full of spuds and stuff and you think oh no maybe I shouldn’t have done that and it starts getting sore and, it’ll be alright, it’ll be alright and then the next day you know, whammo, it’s really sore and you can’t do anything.

This uncertainty was also apparent in participants’ reflections on the meaning of the pain they were experiencing. For instance, some participants interpreted ongoing pain sensations as a sign of progressive physiological damage in their injured limb. As this conflicted with the reports they were getting from their doctors, this created a sense of frustration and uncertainty about how much upper limb activity was appropriate.
Uncertainty subtheme 5: Uncertain future function

All but three of the participants in this study were at least three months from time of injury when they participated in the interview. This was reflected in the consideration participants gave to the implications of their injury. All participants expressed some worry about the future function of their upper limb. For those participants earlier in the recovery process, this was usually expressed as worry related to the eventual return of normal functional use of the limb. For those later in the recovery process who continued to experience pain or functional deficits, the distress was more focused on the long-term implications of the injury, including the possibility of developing a degenerative condition that might cause chronic pain such as osteoarthritis.

The uncertainty of how well the limb would function in the future was present in many of the comments relating to participants’ distress about their employment. For some, this distress was reflected in uncertainty about how well they would be able to cope with job tasks when they returned to their position. For those who worked in occupations that required dexterous use of their hands, the expectation that their upper limb function must return to “normal” before return to work placed a tremendous pressure on them to regain function. Those who had been off work for a longer period and had potentially already realised they could not return to their previous job expressed a more global concern about what kind of work they might be able to perform in the future.

9.4.2 Theme 2: Disruption

Work-related issues were also apparent in the second theme, which encompassed frustrations relating to an interruption or forced change to established routines or “normal” activities. Due to their unexpected nature and often extended healing times, traumatic upper limb injuries create disruption in the lives of those who sustain them regardless of the severity of the injury. In fact, anticipation of this disruption was so strong in one participant that he reported that it was one of the first things he thought about when his injury occurred: “Blood dripping all over the place, feeling really stupid and annoyed and quite concerned because I had a lot of work to do and I thought... this is really going to disrupt things.”
Disruption to personal life centred around a temporary inability to complete simple everyday tasks, routines, or favoured activities to a satisfactory level. All participants reported distress related to at least one of these categories. Disruption that involved other people included issues that affected the whole family (like financial stress), co-workers (like scheduling at work), or friends (like participating in normal social activities). Disruptions to personal things and disruptions to issues that involved other people were captured in six subthemes: 1) Daily tasks and routines, 2) Leisure pursuits, 3) Boredom, 4) Financial security, 5) Shared responsibility, and 6) Normal social relationships.

**Disruption subtheme 1: Daily tasks and routines**

The most obvious and frequently cited source of frustration was the inability to complete simple daily tasks without difficulty. Following upper limb injuries, the use of casts and splints, swelling, pain, weakness and numbness may all cause difficulty with functional tasks. Participants reported difficulty with a wide range of tasks including cleaning teeth, squeezing a shampoo bottle, putting in contact lenses, using toilet paper, showering, driving, using a knife and fork, pulling on socks, and writing. As recovery progressed, some participants reported that they took a pragmatic approach to the issue, finding that they just did not get so bothered about things they couldn’t do anything about than they normally would. Others enlisted the help of family members or friends. One participant talked about working through ACC to take advantage of the benefits she was eligible for to alleviate the distress caused by her inability to complete daily chores. However, when the difficulties completing individual tasks led to a disturbance in normal pace of life or altered regular routines, all participants reported distress. In particular, the increased amount of time required to complete a normal routine caused by the addition of several steps in the routine (i.e. covering the arm in a plastic bag to shower) caused frustration:

*It disrupted [my routines] a lot because I’d have to focus more on my hand than anything else like going over all the exercises...it would just take so long to get ready and it just used to drive me nuts.*
This distress was compounded by a loss of control over the way normal routines were accomplished. For instance, one participant lived on a large property that included a small number of farm animals with his wife, and the two of them had established a working schedule for completing the myriad of daily tasks required to keep their property running smoothly. Although he appreciated the help his wife gave him while he recovered from his injury, he reported that he found himself “cringing” while watching her complete tasks that would normally be his responsibility in a way that he found unacceptable.

**Disruption subtheme 2: Leisure pursuits**

Disruption to leisure pursuits was a source of distress for just over half the participants. However, those who did report distress were often quite forceful about the degree to which this upset their lives. Leisure pursuits were a valued source of stress relief and they often spent a great deal of time participating in these activities. The inability to participate in these activities, therefore, created distress not only by severely altering the participant’s daily and weekly schedule, but also by removing a means for dispelling this distress. One participant described the disruption to his favoured activities as an extreme source of frustration: “And my golf, like I can’t play rugby so I play golf and now I can’t play golf at the moment so... which is pull my hair out material.”

For two participants, injuries resulted in the cancellation of a much anticipated holiday. For one of these participants, the disruption of an annual ski trip created distress related to guilt that he had ruined his wife's holiday as well as his own and he found this to be “probably one of the hardest things” about recovering from his hand injury from “an emotional point of view or a psychological point of view.”

**Disruption subtheme 3: Boredom**

Being unable to participate in normal activities and sports led to feelings of boredom for eight participants. Most of the participants in this study were normally busy during the day and found that the forced inactivity post-injury was stressful. All but four participants were employed. Of those who were not employed (including those who were retired), one lived on a working small farm
and normally tended to a number of animals while another was very involved in
crafts and a cycling group prior to her injury. Immediately following injury, all
participants reported that they were unable to participate in aspects of their jobs
or leisure pursuits. Interestingly, many of the participants addressed this distress
by denying that boredom was an issue. For some, finding alternative ‘occupations’
alleviated boredom and participants responded to questions by insisting that there
was “always something to do.” However, even the thought of being bored or of not
being busy was distressing for most of the participants: “Yeah I like to keep on
doing things and you know if I didn’t you know I’d end up sitting down...doing
nothing. And I can’t just sit down and do nothing. It does my head in.”

The forced disruption to their usual activities also led participants to feel as though
they were not accomplishing anything or that their daily lives had no direction.
One participant reported that she tended to get bored very quickly since having
her injury because she felt that her injury and her focus on recovery resulted in her
having no tangible goals in her life to focus on.

**Disruption subtheme 4: Financial security**

For most participants, finances were not an issue in the short-term due to the
financial assistance provided by ACC and/or employers. In fact, one participant
reported that he welcomed the break from work initially. However, although ACC
provides cover for a percentage of income during the recovery period,
this benefit typically extends to only a portion of total income lost due to inability
to work (80% of up to $110,000). Although this reduction in income was absorbed
without difficulty for some, four participants reported that they felt the effects of
this deficit acutely after several weeks on ACC benefits:

> I mean it was good to have that time off work but after a couple of weeks on
> ACC and you realise you’ve got mortgages to pay and bills to pay and things like
> that and your money isn’t quite there.

In addition to the obvious difficulties with lost income, the procedures associated
with obtaining financial benefits from ACC created distress. For instance, the
predictability of a regular income allowed one participant to budget his family
finances quite tightly month by month. However, his payments from ACC had been less regular and he reported that he had not received one payment in a timely manner from them. This resulted in significant distress for him and his family as their regular budgeting routine did not allow for deviations of this sort.

**Disruption subtheme 5: Shared responsibilities**

One of the more commonly reported distressing consequences of injury was guilt relating to a disruption to the ability to fulfil a role in a shared relationship. This distress was often related to work roles. For instance, several participants described guilt resulting from the extra strain their absence at work had on the people they worked most closely with. For those who worked in a team environment, this unexpected absence resulted in staffing difficulty, particularly around busy times of year or during the holiday seasons. If the employer was unable to increase staffing to cover the position, participants felt distress that their co-workers had to absorb the extra workload their absence created. In some cases, participants were also worried about the consequences to the community resulting from their absence at work. For instance, decreased production at work, increased waiting times for health procedures, or deferral of long-term projects all created distress in participants.

Others described distress around the disruption their injuries had on the regular routines of family members. In some cases, these family members were now completing more than their normal share of the household work or were spending extra time helping the participant to cope with everyday activities. One woman had moved back into her parent’s house immediately after her injury so that her mother could help her with self-care tasks. In addition to the distress this participant felt asking her parents for help, she also related distress brought on by the disruption she felt that her presence in parents’ house created for their daily schedules.

**Disruption subtheme 6: Normal social relationships**

Upper limb injuries also caused an interruption in normal social dynamics in participants’ lives. In some cases, the injury resulted in participants spending less
time with valued friends or family members. This disruption was often due to the physical impairments related to the injury. For instance, many participants described socialising with friends during physical activities such as sporting events or motorcycle rides. In the early days of their injury, participants were unable to be involved in these activities due to healing structures and restrictive casts or splints. However, as healing progressed, participants reported that these disruptions to their friendships continued, in part due to the perceptions of their friends and family members about their injuries: “I felt like people ... don’t really bother to invite me anymore because they’re kind of like, oh she probably can’t bowl so we won’t invite her.”

Intimacy in relationships with partners was also an issue. Although no participant reported an impact on physical intimacy due to their injury, several referred to a negative influence on emotional intimacy. One man, who had been employed full-time prior to his injury and was currently off work while his injury healed, reported that recovering from his injury magnified the negative aspects of his relationship with his wife. In his case, the increased time he spent home with his wife and children disrupted their normal social dynamics to the point where “those rocky days seem like they’re landslides.” On the other hand, two participants felt that their injuries had brought them closer to their partners. For these participants, the ability to rely on their partners for comfort, physical and emotional support strengthened the bond they shared. Both of these participants were retired and were in long-term, stable relationships and both pointed out that the injury had not radically altered the amount of time they spent with their partner.

9.4.3 Theme 3: Identity

The disruption to routines and relationships that many participants described also impacted the ways in which they saw themselves. The third theme, identity, relates to the influence that upper limb injuries had in shaping how participants felt about themselves as family members, co-workers, functioning members of society, and as healthy, vital human beings. All participants reported distress relating to at least one aspect of this theme.
I was fine the way I was, I actually want my thumb back and I don’t want to be, I don’t want to be useless. I don’t want to be dependent on other people. I want to be able to contribute in the household more. I don’t want to be having to ask the boys to bring in the firewood, although they can. You know I just want to be able to do the dishes and you know, I don’t. All of those other things and I just, I want to get back to work, I want to be, I want my brain to come back to me again.

This statement illustrated how this participant’s identity encompassed his roles within his family and his professional life. His concrete example of how the injury altered his usual contributions to the family and his assertion that “I was fine the way I was” suggests that he feels fundamentally changed in some way through his experience and he is anxious to return to his “normal” self.

The subthemes within the theme of Identity include: 1) Fragility, 2) Patient role, 3) Dependence on others, 4) Loss of work self, and 5) Loss of public self. Each is described in more detail in the following sections.

**Identity subtheme 1: Fragility**

The traumatic and accidental nature of the injuries represented in this study contributed to a newfound sense of fragility following injury for about half the participants. These participants talked about their need to re-examine their self-image as a robust, healthy and invulnerable being. For one gentleman, this was reflected in a dawning awareness of advancing age:

*It makes me that wary and then I was out you know with this firewood and I tripped on a bit of a branch and I went down on my knee and I went uh I’ve got to be more careful. It must be an age thing you know.*

This awareness was also articulated by younger participants, who admitted that their injuries made them “feel that mortality thing” or recognise the danger in some of their activities that had previously gone unnoticed. For instance, one participant had injured himself while mountain biking down steep terrain. While he did not intend to give up his mountain biking, he was now more aware of the dangers of steep corners and slippery paths and this awareness makes him ride more
cautiously. This awareness was distressing to him because it forced an unwanted change in perception of his abilities and sense of self as a risk-taker.

This change in perception was also represented in an awareness of the fragility of bodies in general. Whereas before their accident participants might not have noticed the creaking and pops in their joints, following injury they were keenly aware of these common noises and were more distressed by the possibility that these noises might represent evidence of further damage to their joints.

Identity subtheme 2: Patient role

A shift in identity was felt most acutely in the role of patient. In particular, participants described the feeling that they were viewed not as a human beings but as simply bodies or body parts by those caring for them and that the healthcare procedures and environment reinforced this feeling. It was very noticeable to participants when healthcare professionals approached them as more than “just a body” during treatment sessions. One man described a positive interaction with a physiotherapist who took the time to “make me feel as though I had care for my thumb and somebody was looking out for me as well as my thumb.” This sense of being treated as a “self” significantly impacted participants’ positive outlook on their injuries as well as the care they were receiving. In contrast, one participant described the actual process of losing his sense of himself as a person and getting redefined as a number in a system:

_The funniest thing was being asked to get out of my clothes and put into an invalid’s gown with the back opening. And that was the point where I, I suddenly felt disempowered. And I suddenly felt like, you know, a number on a clip board, umm that might well get lost. Up until then I knew who I was, you know...But as soon as I got into [the hospital gown] I just felt umm, yeah, certainly some of who I was got stripped away._

For some, adopting the patient role involved the conscious setting aside of a previous self. This role-playing involved adopting a passive stance in treatment choices as well as an alteration in expected behaviours. In many cases, this attitude was reflected in participants’ descriptions of their injuries or themselves in third
person, as though their limb had ceased to be a part of them but was now simply an object. While this shift was distressing for most participants, adopting the role of patient and allowing others to take over for them was a comfort for others. For these participants, their trust in the healthcare system and for those who were caring for them made the role of patient an easier transition.

**Identity subtheme 3: Dependence on others**

This ‘patient role’ was also manifested in at least a temporary reliance on others for assistance during some part of the recovery period. This issue came up frequently in ten interviews, suggesting that it was a common experience. For some, this was just a normal part of the give-and-take relationship they shared with family and friends and would be balanced by returning the favour at a later date. However, others found having to rely on their family and friends to get through daily tasks to be very distressing. In some cases, the distress was related to a feeling that they had somehow lost their identity as a competent adult and had regressed into a more childlike state of having to depend on someone to complete basic tasks:

*Even though we've been together quite a few years you know, it was, it felt quite awkward having to have her shower me you know daily sort of thing because I couldn't use my wrists and stuff like that so...I think it was just a psychological thing really. You know you sort of, you're almost forty you should be able to do that sort of thing yourself.*

One of the most objective examples of this regression was the loss of independence associated with being unable to drive a car. Even a temporary loss of this ability was extremely distressing for some participants. The aggravation associated with having to ask others for rides to social events and work reinforced a loss of identity as an independent adult.

**Identity subtheme 4: Loss of work self**

Identity and work-related issues were closely linked. At the time of the interviews, all but three of the participants were employed. In many cases, participants had been in their jobs for several years and described themselves as skilled and
valuable employees. As such, they described their distress at losing their identity as a productive employee and co-worker and having to work at a less than optimal level: “Certainly I think I was quite stressed about the idea of going back to work I think... I’m going to be useless you know, what’s the point?”

For others, distress was more related to facing the possibility of being unable to return to a valued career that had helped to shape one’s identity. For instance, one participant who had suffered bilateral wrist sprains had worked all his adult life as a builder and identified quite strongly with the role of a physical labourer. At the time of interview, he was facing another surgery in an attempt to alleviate ongoing pain and was unable to lift heavy objects or use either wrist with any force. He quite clearly articulated distress surrounding his inability to imagine himself working at any other sort of job.

In contrast, those who had reached a high level of seniority in a career that did not require heavy manual work appeared to have less distress relating to their occupational identity. For instance, one participant described how the security of having been in a particular job for an extended period of time mitigated distress about how her injury impacted her ability to complete her work tasks. While she may not have been able to do all her job tasks to the best of her abilities, her track record and the respect she felt from those around her ensured that her identity within this role was secure.

**Identity subtheme 5: Loss of public self**

In addition to the more private sense of identity loss described in becoming a patient and loss of work-related roles, a loss of public identity was also described relating more to the persona that they presented to the general population. In the immediate aftermath of the trauma, this socially acceptable identity was closely related to the way participants presented themselves to healthcare professionals who were treating their injury:

> Up until then I knew who I was, you know. I was filthy dirty and I was in my boots and I was thinking, gosh, I wish you now I hadn't taken this as a Saturday. I wish I had gotten up, had a shave, had a shower before I started work this
morning instead of thinking I’m going to have a dirty day at work... I would feel as though I wasn’t an imposition to other people... there’s that social nicety of desiring to present a... clean and presentable body.

However, as recovery progressed, the challenges to public identity continued beyond the patient role. The lingering physical impairments due to the injury contributed to a lack of familiarity with the image that participants projected to the world around them. For instance, an inability to effectively execute physical tasks normally associated with maturity and independence, like signing your name on a cheque or a bill, resulted in embarrassment about the image this projected to others in public situations.

Public self was also reflected in a sense of self as somehow separate from society (or less socially acceptable) following upper limb injury. In particular, the appearance of the limb, or the appearance of the splints required to rehabilitate the limb, caused three participants to feel detached from those around them. This distress was often illuminated by the tremendous sense of relief described in the experience of coming across another person wearing the same splint or with similar scars. Others described a similar sense of relief in the realisation that they were not the only ones who had difficulties completing mundane but intimate functional tasks.

Identity subtheme 6: Appearance

A sense of detachment from the “normal” world was also was reflected in how participants described the appearance of their injured limbs. For many, the appearance of their limb did not appear to create a great deal of distress. However, all of the participants at some point in the interview compared their injured limb to how it would “normally” look (i.e. it was more swollen or more red). The participant with the most disfiguring injury in the sample (thumb tip amputation) found this alteration in body image very distressing:
And I’d sort of forgotten about this and I was walking up the hill and I, I just happened to look at my thumb and it, it was a bit lumpier and redder and larger at that stage and I just looked at it and I went, oh shit, oh my god, and I just had this sense of despair you know. I’d forgotten about it.

This loss of identification with one’s own body was reported by all participants at some point in the interview. Disruption to normal angles and contours was particularly distressing for some participants. For instance, at the time of initial injury, several participants described the sensation of looking down at their disfigured limb with a sense of detachment from their bodies. In one case, a participant stated that this sense of detachment was more disturbing to her than the pain she experienced from the injury.

9.4.4 Theme 4: Legitimacy
Concerns about the appearance of the hand created distress for more reasons than just a disturbance in people’s images of themselves as whole and unbroken. Because mild to moderate upper limb injuries often involve a small joint or body area, eight participants discussed feelings of awkwardness about the extent of disruption and pain such a small injury had created in their lives. For many, the visible signs of their injured limb were directly related to how they interpreted the severity of their injury as well as how others reacted to their injury. The fourth theme is distress surrounding the legitimacy of the injury, both in terms of participants’ own views of the legitimacy of their injury and the legitimacy that others attributed to their injury. The following sections describe the five subthemes of Legitimacy in more detail: 1) Size matters, 2) Visual signs, 3) Seeking initial medical care, 4) Self-blame, and 5) Reactions of others to the injury.

Legitimacy subtheme 1: Size matters

In general, participants expressed a viewpoint that their injuries were less serious than an injury to a larger or more crucial body part. Because hand injuries frequently involved small segments of the body, such as a single finger or hand, attitudes of participants about their upper limb injuries were often tinged with a sense of sheepishness: “I think you also feel a bit of a fraud ‘cause like it’s a tiny little finger, a tiny little bone and it just impacts so much on your life.”
This attitude was also reflected in participants’ interpretations of the reactions that friends and co-workers displayed to participants’ injuries. All participants reported that at some point a friend or co-worker had minimised the seriousness of their injury. Despite this minimisation and sheepishness, however, these statements were nearly always followed by a comment about participants’ amazement that such a “small” injury could have such a huge impact on so many areas in life.

**Legitimacy subtheme 2: Visual signs**

To a large extent, the appearance of the injury played an important role in the sense of legitimacy participants felt about their injuries. For many, visual signs of an injury like blood or inability to move a joint were much more indicative of a serious injury than pain immediately following the trauma experience: “It was incredibly painful. But I’ve pinged so many bits and you go ooh crikey. And you know, they turned out to be fine...But the blood is dramatic...Blood helps. A lot of it!”

Visual reminders continued to be an important indicator of injury throughout the recovery process. For instance, participants reported that visual signs of injury served to justify the pain or functional difficulties they were experiencing; no visual signs of injury created distress as participants questioned that the symptoms they were experiencing were justified. In addition, visual signs served as a cue to those around them that the injury still existed and was still healing. As the swelling decreased and the scars healed, participants reported more distress due to having to justify the ongoing complaints of pain and functional limitations they were experiencing (both to themselves and to others). This distress less apparent in participants who had undergone surgery as the resulting scars appeared to legitimise the injury in the minds of those who had undergone surgery (i.e. they were able to point to the scars as a physical marker of injury.

**Legitimacy subtheme 3: Seeking initial medical care**

One of the more serious consequences of some participants’ concerns with the legitimacy of their injuries was that it led to delays in seeking initial medical care. While the reasons for this delay varied among participants, the fear of illegitimacy
was common. In some cases, participants expressed feelings that their injury was not dramatic enough to ask for help. Other participants reported a fear of feeling stupid for seeking care only to be told that their injury was minor and did not require significant treatment:

*There was still an element of how am I going to feel if I get there and it’s just a superficial scratch? You know? ‘Cause we’ve gone all the way to [the emergency department] and I’m going to feel a right fool!*

If there was an obvious visual component to the injury ("Well it was gushing blood. And so even I could see that there’s a problem here"), people were much more likely to seek initial medical evaluation and treatment than if they simply had pain. Continued visible signs of injury such as bruising or swelling also led people to seek care even if they had initially made the decision to not follow-up with the medical system. Reactions of family members and trusted companions also played a role in participants’ choices to seek medical care; in most cases, companions’ concerns appeared to lend credibility to the injury and resulted in participants seeking earlier care.

**Legitimacy subtheme 4: Self-blame**

The hesitation to accept their injuries as legitimate injuries was also apparent in the blame participants assigned for their injuries and recoveries. Nine participants expressed doubt about the legitimacy of their injuries by blaming themselves for delays in recovery or for the cause of the injury. This tended to be associated with expressions of distress or disgust with themselves and frequently involved descriptors such as “stupid” or “careless.” This sense of self-blame was prevalent throughout many of the interviews and most often appeared during an attempt to justify why the injury had occurred. Self-blame was also present in comments about the recovery process and why, perhaps, their injury had not resolved in an expected time-frame or why such a “small” injury continued to limit function or cause pain.
Legitimacy subtheme 5: Reactions of others to injury

The importance of visual signs of injury was described by participants not only in themselves, but also in those they encountered during their treatment. For instance, one participant reported that the treating physician she saw at the emergency room indicated to her that her injury was most likely not serious as he could not see any outward signs of an injury (even though this participant had actually sustained a complex fracture). In other cases, a careless comment by a family member or friend contributed to a sense of illegitimacy by making light of the injury or blaming the participant for causing his or her own injury. Although most participants reported that co-workers and family members were supportive, once the obvious visual signs of the injury had faded, the initial sympathy and support they received began to dissipate.

Fading support was especially apparent when it involved specific job duties. Several participants reported distress related to the negative reactions of their co-workers to their modified duties at work or their time off work. Specifically, participants felt that their co-workers believed they were avoiding their duties due to laziness. This resulted in some people questioning their current perceived level of disability and pushing themselves to do activities that they may otherwise have not felt ready to do:

"I think once I was out of the cast that sort of made a huge difference and obviously from their point, from work's point of view it makes you look as though, well he looks alright. There shouldn't be any reason why he shouldn't be doing most things really, you know really, so and when they sort of pushed me into doing things that perhaps I originally wouldn't, I wouldn't have done or couldn't have done year I said well fine just get on with it you know."

9.5 Cross-cutting

In addition to the four themes that were developed from the data, there were seven issues (pain, work-related issues, appearance, difficulty with functional tasks, and rehabilitation, encounters with ACC, and social relationships/intimacy) that appeared to be fairly obvious sources of distress during initial coding and were coded as themes. However, further analysis revealed that these issues were
actually cross-cut between the multiple themes. For instance, distress related to pain sensations came up in nine interviews. However, a careful review of this data revealed that the underlying distress was related to a variety of issues surrounding the pain, not necessarily the pain itself. In addition, concerns about appearance (e.g. inability to perform a work task) were also present in data that were primarily about loss of identity, uncertainty, disruption or legitimacy. The presentation of these five issues within each of the main themes is described in the sections above and is illustrated in Table 9.4. Further detail regarding these issues is presented in poster form in Appendix F.

9.6 Discussion

This thematic analysis identified sources of distress during the rehabilitation phase following mild to moderate upper limb injuries. Psychological distress within this context arose from: 1) uncertainty, 2) disruption, 3) identity, and 4) legitimacy.

Theme 1: Uncertainty

Confusion and uncertainty created distress for all participants in this study. Uncertainty has been defined in healthcare research as the “inability to determine the meaning of events” (Mishel & Braden, 1988)(p.98) and is recognised as a common and distressing part of the illness or injury experience (Hansen, et al., 2012). Lazarus and Folkman (1984) argue that the lack of knowledge relating to uncertainty creates distress by leading the individual into a constant cycle of appraisal and reappraisal of the potential threat to self that the injury or illness represents (See Chapter 6). This results in conflicting thoughts, feelings and behaviours and eventually leads to a general state of confusion and distress (Lazarus & Folkman, 1984). In the current study, confusion and uncertainty were largely related to lack of understanding about the injury, the healing processes, and the procedures of the medical system in general.
Table 9.5: Interweaving of identified sources of distress between 4 main themes

<table>
<thead>
<tr>
<th></th>
<th>Uncertainty</th>
<th>Disruption</th>
<th>Identity</th>
<th>Legitimacy</th>
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<tbody>
<tr>
<td><strong>Pain</strong></td>
<td>Lack of understanding</td>
<td>Disruption to routine</td>
<td>Loss of identity as young, healthy person</td>
<td>Pain does not contribute to legitimacy of injury</td>
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<td></td>
<td>“But it was that whole...the movement was okay, it was the pain that bothered me. And I think it was because I didn’t understand it.”</td>
<td>“I mean most of its just sort of stiffness really. Like first thing in the morning, you wake up in the morning and your hand, it feels like that.”</td>
<td>“And I get it when I wake up in the morning so I wonder if it might be linked to that, the pain might be linked to that because I get it in both hands. Another old, getting old thing isn’t it?”</td>
<td>“It was incredibly painful. But I’ve pinged so many bits and you go ooh crikey. And you know, they turned out to be fine...But the blood is dramatic...Blood helps. A lot of it!”</td>
</tr>
<tr>
<td><strong>Work-related issues</strong></td>
<td>Future job prospects</td>
<td>Disruption to finances</td>
<td>Loss of identity as productive member of work team</td>
<td>Work’s view of legitimacy</td>
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<td></td>
<td>“Just you know ’coz the thought of having to have a fused wrist and I don’t know how that’s going to impact on my future job prospects... And I’ve always worked with my hands like building and stuff like that as well.”</td>
<td>“I mean it was good to have that time off work but after a couple of weeks on ACC [subsidised healthcare] and you realise you’ve got mortgages to pay and bills to pay and things like that and your money isn’t quite there.”</td>
<td>“Certainly I think I was quite stressed about the idea of going back to work I think. ...you have this sort of fear of... how other people perceive what you do and the fact that you’re just there and, you know, not contributing an awful lot.”</td>
<td>“I think once I was out of the cast that sort of made a huge difference and obviously from their point, from work’s point of view it makes you look as though, well he looks alright. There shouldn’t be any reason why he shouldn’t be doing most things.”</td>
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(continued) Table 9.5: Interweaving of identified sources of distress between 4 main themes

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Uncertainty</th>
<th>Disruption</th>
<th>Identity</th>
<th>Legitimacy</th>
<th>Reactions of others</th>
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<tr>
<td>Uncertainty about integrity of finger</td>
<td>Disruption to normal relationships</td>
<td>Loss of self as productive family member</td>
<td>Denial of impact of injury followed immediately by description of how it had impacted</td>
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<tr>
<td>&quot;I thought I’d dislocated it and I thought by gripping the bar that might have, that just, well it did. It seemed to work alright ‘coz I kept my, put my glove back on. I didn’t want to look at my finger again and I kept my glove on.</td>
<td>“They sent me home with like all these little things to change the dressing myself, or my Mum because I couldn’t do it. So my Mum had to do it and she’s like got the weakest stomach ever so she just had to try not to look too much while she did it.</td>
<td>“And even when they see it they, they recognise it and they’re really, really sympathetic. But they also umm, also think that I’m just who I am and I’m going to be able to do stuff.</td>
<td>“They just assume it’s back to normal again. But they don’t, yeah, that’s it once the visual impact goes it’s sort of their level of concern obviously drops away because they can’t see anything wrong with you.</td>
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<tr>
<th>Difficulty with functional tasks</th>
<th>Uncertainty about function of hand</th>
<th>Disruption to daily routines</th>
<th>Loss of self as reflected through inability to complete daily tasks</th>
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<tr>
<td>Interviewer: Were you worried about [being able to use your hand in the future] at the beginning?</td>
<td>And of course it’s not the dominant hand so I could still write but even using the keyboard, you know? .... So that was really, really quite frustrating.</td>
<td>I was fine the way I was... I want to be able to contribute in the household more. I don’t want to be having to ask the boys to bring in the firewood, although they can. You know I just want to be able to do the dishes and you know, I don’t.</td>
<td>Umm, well, washing. Well it wasn’t actually too hard to do anything in particular ‘cause as I say it’s not my dominant hand so I’m used to doing more things with my left hand. It was a pain trying to put things on like, you know keep it, keep it dry.</td>
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(continued) Table 9.5: Interweaving of identified sources of distress between 4 main themes

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<th>Identity</th>
<th>Legitimacy</th>
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<tbody>
<tr>
<td><strong>Rehabilitation</strong></td>
<td><strong>Understanding of injury and process</strong></td>
<td><strong>Impact of rehab (splint) on daily life</strong></td>
<td><strong>Identity of self as “bad patient”</strong></td>
<td>None.</td>
</tr>
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<td></td>
<td>Yeah I didn’t really understand the extent of it … I thought it would be a broken arm. You’re in a cast for six weeks, you take it off and you’re like oh yeah, my hands work now, all good. But it definitely wasn’t that easy.</td>
<td>And then taped to it basically so it’s sticking out at the end of the plaster and unfortunately the big problem with it is … you catch everything with it.</td>
<td>I’m not a good patient! … And I think it’s that sort of avoidance technique. OK, so I don’t want it plastered, strapped, anything because it will stop my doing driving, fishing, doing the stuff that I do.</td>
<td></td>
</tr>
<tr>
<td><strong>Encounters with ACC</strong></td>
<td><strong>Understanding of ACC process</strong></td>
<td><strong>Disruption to finances</strong></td>
<td></td>
<td>None.</td>
</tr>
<tr>
<td></td>
<td>Well [the ACC paperwork] was filled out in front of me in the hospital by a registrar. And, and nobody explained to me how that works… And I’ve never had ACC before. So you know I just thought, ‘This is dodgy.’</td>
<td>And then ACC they forgot to pay me one month, it was just a, one week, it was just quite disorientating because our finances are quite tight and we just about defaulted on our mortgage because ACC muck[ed] up.</td>
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But his main concern was, When are you going to be able to get back to work? … Actually I’ve just had a really nasty accident. My biggest concern is to get back to work because I had so much to do but you, you asking me that straight off makes me think that you actually are not really concerned about my welfare.
(continued) Table 9.5: Interweaving of identified sources of distress between 4 main themes

<table>
<thead>
<tr>
<th>Source of Distress</th>
<th>Uncertainty</th>
<th>Disruption</th>
<th>Identity</th>
<th>Legitimacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social relationships/intimacy</td>
<td>None.</td>
<td>Disruption to social relationships</td>
<td>Loss of identity as an independent adult</td>
<td>None.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>But I felt like people didn’t invite me to things anymore. Like a lot of people like they’d be doing something but I wouldn’t get invited … they’re kind of like, oh she probably can’t bowl so we won’t invite her.</em></td>
<td><em>Even though we’ve been together quite a few years you know, it was, it felt quite awkward having to have her shower me you know daily … I think it was just a psychological thing really. You know you sort of, you’re almost forty you should be able to do that sort of thing yourself you know.</em></td>
<td></td>
</tr>
</tbody>
</table>
Because most of the participants did not have a background in healthcare or anatomy, lack of understanding of the pathophysiology and healing process associated with their injury was a source of distress. This lack of knowledge made it difficult for individuals to anticipate the physical ramifications of activity (e.g. pain or swelling of injured limb), making the swelling or pain they experienced appear unpredictable and, thus, distressing. The inability to anticipate the consequences of physical actions has not been reported as a stress factor following traumatic upper limb injuries. It is possible that this stress factor is related to the milder severity of injuries in this study as compared to previous research. For instance, because most participants reported that pain was not a major issue for them during their recovery, some reported surprise when they did experience pain or swelling. In contrast, a more severe injury may cause more predictable, constant pain levels and therefore the relationship between activity and pain is less uncertain. Further exploration of the relationship between severity of injury, predictability of pain and distress would help to elucidate this issue.

Uncertainty was also related to participants’ lack of knowledge about the processes surrounding injury in New Zealand (such as how to lodge a claim with ACC) and the communication styles used by healthcare professionals. For instance, participants reported distress relating to their uncertainty about the status of their claims within ACC. Because many of the ACC-related processes were initiated and managed by healthcare professionals, poor communication between participants and healthcare professionals, case managers, and employers contributed to uncertainty and distress. This particular distress may be unique to the New Zealand healthcare system, but it is also likely to be present in other systems which rely on healthcare providers to report injuries to compensation companies (such as insurance companies).

The use of medical jargon by healthcare professionals created confusion and distress in several participants. This source of distress complements the findings of Vranceanu, et al. (2011), who demonstrated that the use of certain orthopaedic words (such as ‘pain’) had more negative emotional power than related words (such as ‘discomfort’ and ‘ache’). Other research has shown that the words used by healthcare professionals can have an impact on how patients cope with their injury.
as well as on their reports of pain intensity and disability (Lautrette, et al., 2007; Lienard, et al., 2006; Schofield, Elwyn, Edwards, & Visser, 2003; Vranceanu, Elbon, & Ring, 2011). Difficulties with communication may be further confounded by the use of computers by general practitioners, which interrupts the flow of conversation and the engagement between patient and doctor (Dowell, Stubbe, Scott-Dowell, Macdonald, & Dew, 2013). A greater attention to the quality, content, and extent of communication between patients, healthcare professionals, and other interested parties (such as ACC case managers or employers) may help to decrease uncertainty and distress in patients recovering from injury.

Issues related to uncertainty in upper limb diagnoses have been previously reported. For instance, Bamford & Walker (2010) found that lack of information concerning application and removal of casting following wrist fracture increased anxiety related to the function of the hand (Bamford & Walker, 2010). Distress related to the uncertainty associated with future hand function has also been found in those with severe hand injuries (Gustafsson, et al., 2000). Many of the participants in the current study expressed concern about future upper limb function as well, suggesting that future hand function is a stress factor for upper limb injuries ranging in severity from mild to severe. Uncertainty related to the diagnosis of idiopathic (unexplained) upper limb pain has also been associated with higher levels of anxiety and maladaptive coping mechanisms (Ring, Kadzielski, Malhotra, Lee, & Jupiter, 2005). As participants in the current study had sustained accidents and received verifiable diagnoses, this type of uncertainty was generally not an issue. However, one participant did experience a lengthy delay in receiving confirmation of his diagnosis and expressed distress about the uncertainty he felt waiting to receive this confirmation. Providing as much information as possible to patients regarding their treatment, expected outcomes and diagnoses may help to alleviate some forms of distress.

The broad influence of uncertainty on distress in the current study reflects the findings of studies of people with various health conditions. In a review of research on uncertainty in nursing patients with diagnoses ranging from endometriosis to cancer, Hansen and colleagues found that uncertainty has been associated with the symptoms of illness, financial insecurity, prognosis, unpredictability, unmet need
for information, the medical system in general, and unknown aetiology of symptoms (Hansen, 2012). The similarities in findings between the current study and Hansen (2012) suggests that uncertainty may be a common aspect of recovery from a variety of illnesses and injuries. However, the unique sources of uncertainty following traumatic upper limb injuries described above suggests that different illness situations also have their own stressors.

**Theme 2: Disruption**

Distress related to disruptions to everyday life and routines was common. Participants reported frustration with their inability to complete simple tasks, such as showering, and complex tasks, such as manipulating equipment at work. Disruption to functional abilities also led to more profound disruption in participants’ lives. For instance, participants reported that the functional limitations associated with their injuries compounded so that everyday routines took longer or had to be altered. At times, these limitations forced temporary suspension of participation in sports or leisure activities, which were highly valued as a means to relieve distress. As disruptions to routines and inability to return to work continued, financial security became a greater source of distress and participants reported boredom and feelings of “uselessness.” As our hands are often our initial point of contact with the environment around us, these tangible sources of distress were often the first to be cited when participants were asked to describe aspects of their experience that had been stressful for them, suggesting that the distress associated with these disruptions was particularly bothersome.

Traumatic upper limb injuries also created disruptions in participants’ normal social routines and relationships. Although social support has been explored as a factor in outcomes following traumatic upper limb injuries (Lam, Chan, & Lam, 2011), disruptions to social relationships and routines have not previously been reported as a source of distress during recovery from upper limb injuries. Due to the open-ended questions used during the interviews, this study may have provided an opportunity for participants to discuss the impact of disrupted social relationship on their levels of distress where other studies have not. An appreciation of the distress caused by disruptions to social relationship and
normal social routines may assist healthcare professionals in including these issues in goal-planning.

Sources of distress related to disruptions were similar to those found in quantitative and qualitative studies exploring recovery from hand injuries. For instance, Smith, et al. (1985) suggested that even minor hand injuries can create financial distress (Smith, Auchincloss, & Ali, 1985). The feelings of boredom and “uselessness” due to inability to participate in tasks and routines following severe traumatic hand injuries also have been cited as stress factors in the early days post-injury (Gustafsson, 2000) and were present later in recovery in our sample. Difficulty with functional tasks is often reported as a source of distress by clinicians and authors in studies relating to upper limb injuries (Bialocerkowski, 2002; Chaudhury, 2009; Gustafsson & Ahlstrom, 2004). Gustafsson, et. al (2000) found that participants described these impairments and the subsequent difficulty they had completing even simple daily tasks following severe upper limb injuries in great detail, suggesting a high level of frustration and distress (Gustafsson, et al., 2000). The inclusion of splints or casts may exacerbate this frustration by further limiting function (Veehof, Taal, Willems, & van de Laar, 2008). These findings concur with the results of the current study, suggesting that limiting the use of one’s hands, regardless of the degree of that limitation, results in some degree of distress for most people. Although the difficulties associated with everyday tasks improved over time, the distress associated with functional limitations was common and was felt very acutely by the participants in this study.

**Theme 3: Identity**

According to Christiansen (1999), our identities are crafted in large part by what we do and how we do it; as such, an inability to participate in meaningful occupations, resulting in changes to the roles we serve in our lives, thus becomes a threat to our identity (Christiansen, 1999). The inability to participate in life roles to the same standard as before their injuries resulted in a loss of identity for all participants in the study. For participants who were employed at the time of injury, the impact on identity was manifested as a loss of self-image as a productive, valuable member of their work team. This theme was particularly
strong in one patient who had sustained significant injuries to both wrists and was facing the prospect of being unable to return to a valued profession. However, the distress at even a brief loss of this identity was acute even in those participants who recognised that this loss was likely short-term while their functional abilities continued to improve. For instance, several participants expressed the concern that they would not be able to contribute anything useful to their jobs upon return to work due to continuing impairments. Some of this fear may be due to the assignment of restricted job duties commensurate with the level of remaining impairments experienced by participants when returning to work soon after injury. This finding suggests that it is important for therapists, case managers, and surgeons to plan return to work strategies carefully and to be aware that patients with even minor upper limb injuries may require support to maintain their identity as a valuable and respected member of their work team.

For two participants with young families, distress and identity loss was related to their role as the primary caregiver and provider for their family. The language these participants used to describe their difficulty in maintaining this ‘provider identity’ when faced with functional difficulties from their injury indicated that it was a significant source of distress for them. This distress was often related to the reversal of roles with other family members (i.e. a child completing tasks that would normally be the responsibility of the adult). In addition, all participants reported distress relating to the temporary loss of identity as an independent adult when faced with having to depend on others for help, even if this dependence was only present in the early days of recovering from injury. Therapists can help to alleviate this distress by working collaboratively with patients to come up with alternative ways to complete difficult functional tasks.

Dependence on others has been reported as a stress factor following severe traumatic hand injuries in those with more severe upper limb injuries (Gustafsson, 2000). However, the authors of this article interpreted this distress in the context of locus of control rather than an affront to identity. They identified two responses to the forced dependence on others: 1) to describe it as a natural part of the “give and take” nature of their relationships, and 2) to view this dependence as a source of distress. These two attitudes were also represented in the current study.
According to Gustafsson, et al, 2000), the contrast between these two responses might be explained by a stronger internal ‘locus of control’ in those who found asking for help distressing. An ‘internal locus of control’ is one in which outcomes of situations are dependent on one’s own abilities and actions. In contrast, an ‘external locus of control’ is a conviction that the outcomes of a situation are outside of one’s control (Rotter, 1966). For those who wanted to manage for themselves, having to ask for help was viewed as an affront to their independence and, subsequently, to their self-esteem. This provides an alternative explanation for distress caused by dependence on others and may be apply to the distress interpreted as loss of identity as an independent adult within this study.

Another theme relating to loss of identity in this study was the uptake of the ‘patient role’ in the early days of their recovery. One participant in particular described his distinct feeling that he had lost “some of who I was” in the process of receiving treatment for his injury. Interestingly, the patient role served as a source of comfort for others, who found that their trust in the healthcare professionals caring for them allowed them set aside their previous identity and to consciously take up a more passive stance as a patient. However, for most of the participants, the feeling of being treated as a ‘case’ or a ‘number’ created distress. This points to the importance of healthcare professionals taking the time to enquire after the well-being of individuals in general rather than simply focusing on the injured body part.

Changes in valued life roles such as spouse, worker, and caregiver have previously been reported in quantitative (Grunert, et al., 1992; Grunert & Maksud, 1993) and qualitative (Chin, Lonner, Jupiter, & Jupiter, 1999; Schier & Chan, 2007) studies of upper limb injuries. Chin, et al. (1999) explored psychological reactions to injury in a series of hand surgeons who had experienced hand or wrist fractures. They found that hand surgeons considered their jobs a major source of self-worth and identity and that they would feel devalued as a person if their injuries hindered their performance level (Chin, et al, 1999). This sentiment was described by several participants in the current study study who were highly skilled in their jobs and valued them as a source of their self-worth. These feelings may also be applied to a valued hobby, sport or skill that provides a sense of identity for an
individual (Wiese-Bjornstal, Smith, Shaffer, & Morrey, 1998). The value that an individual places on his or her role as a worker or athlete or hobbiest appears to be a determining factor in how much distress a disruption to this role will create. Therefore, even a minor injury has the potential to cause a sense of identity loss and distress if that injury creates impairments that impact ability to execute work-related duties.

Schier & Chan (2007) described profound changes in life roles including worker, caregiver and spouse in three individuals with severe traumatic upper limb injuries. Results were similar to the results of the current study. For instance, the feelings of shame and fear regarding potential financial difficulties resulting from the loss of the worker role and the distress relating to role reversals in parenting roles were present in both studies. However, issues relating to children’s perceptions of injury and therapy as reported by Schier & Chan (2007) were not an issue for participants in Study III. In addition, two participants in Schier & Chan described significant difficulties with their role as a spouse following injury. While two participants in Study III reported distress related to this role, this issue was not a major problem for most participants. These differences may be due to the less severe nature of participants’ injuries in Study III when compared to those in Schier & Chan (2007). The similarities between studies reporting changes to life roles following injuries or illnesses and Study III suggest that distress related to the impact of upper limb injuries on life roles may not be limited to those with the most severe injuries, but may be present in differing levels among most individuals with mild to severe upper limb injuries.

Changes in roles have also been reported in those with chronic illnesses such as spinal cord injuries (Yoshida, 1993) and rheumatoid arthritis (Bury, 1982). However, the loss of identity described in groups of people with conditions such as spinal cord injuries or degenerative diseases is much more profound and long-term than that described in this study due to the nature of these conditions. For instance, Charmaz (1987) describes a process of identity reconstruction for individuals with chronic progressive deteriorating conditions. She argues that individuals with such conditions create a hierarchy of identities including: 1) the supernormal social identity (where extraordinary accomplishments are common),
2) the restored self (constituting previous identities from before illness), 3) a contingent self (potential identity that is uncertain due to future illness, and 4) the salvaged self (retaining a past identity based upon a valued activity while physically dependent) (Charmaz, 1987). Due to the deteriorating nature of some conditions, individuals may cycle through these identities in various stages of illness over a period of years (Charmaz, 1987). This form of identity reconstruction is much more complete than the temporary loss of identity experienced by those with mild to moderate upper limb injuries as described in this thesis, perhaps in part due to the time-limited nature of disability typically experienced by those with minor to moderate upper limb injuries.

Theme 4: Legitimacy

One of the more unique sources of distress described by participants in this study was a struggle to accept their injuries as legitimate sources of disruption and pain. This struggle appeared to be comprised of a combination of factors, including appearance of injury, self-blame, extended length of time for recovery, and reactions of others to the injury. In particular, the small size of the body part involved signified to some participants that their injury should not be taken seriously and should not create as many difficulties as it had. The fact that their injury had created difficulties for them was therefore a source of distress. As the outward signs of injury, such as open wounds and swelling, abated, this sense of illegitimacy increased. At this stage, many reported that family members and co-workers began to withdraw extra support or help and questioned participants’ ongoing inability to function at a “normal” level. Each of these factors contributed to the sense of distress that participants reported about their injury.

One of the concerning consequences of the feeling of illegitimacy expressed by a number of participants in this study was a hesitancy to seek medical care. When questioned about their reason for not seeking immediate medical care, many of the participants responded that they felt “silly” about their injury or that they were “embarrassed.” A delay in seeking care for some upper limb injuries may have significant consequences on both treatment options and long-term outcomes (Handoll & Vaghela, 2004). For instance, a displaced fracture with joint surface
involvement that is not set properly may lead to malunion and long-term functional deficits (Brogren, et al., 2011). Participants who did seek care early often did so due to the encouragement of friends or family members. These results are similar to a study about delayed medical care in those with work-related musculoskeletal disorders, who sought care once function tasks became a problem or self-treatment was no longer effective (Smith-Young, Solberg, & Gaudine, 2014). Naturally, not all injuries do require medical care; the swelling and bruising caused by a minor contusion may resolve on its own within a few days. However, providing reassurance to those who do seek care that they are justified in having their injuries evaluated may encourage others to seek appropriate care when needed.

Legitimacy of injury as a source of distress has not been previously reported in the literature related to upper limb injuries. One of reasons for this could be that this study focused on those with less severe injuries than previous studies evaluating stress factors in upper limb injuries (Gustafsson, et al., 2000; Haese, 1985). Less severe injuries such as sprains, closed fractures, muscle strains, and contusions result in few visible signs of injury. In contrast, more severe injuries such as open fractures, tendon lacerations, amputations and multi-trauma injuries result in obvious visual signs of injury (e.g. blood, swelling, open wounds, and, eventually, scarring or deformity). Many of the participants in this study referred to the lack of outward indicators of injury as a source of distress as it contributed to their feelings that their injuries were not legitimate sources of disability or worry. Another explanation for the absence of this source of distress in previous literature is that few other studies have specifically explored sources of distress following mild to moderate traumatic upper limb injuries. Further research to confirm or expand this source of distress would help to provide more information about this stress factor for healthcare professionals.

Issues related to legitimacy of injury have been reported in literature related to other health conditions. In particular, distress related to perceived legitimacy of injury has been reported by individuals recovering from other injuries with no obvious visual signs of injury such as back injuries (Tarasuk & Eakin, 1995), musculoskeletal conditions (Smith-Young, et al., 2014), and electrical burns.
(Mansfield, Stergiou-Kita, Kirsh, & Colantonio, 2014). This research has focused on others’ perceptions of the legitimacy of injury. For instance, in those with back injuries, questions of legitimacy of injury were largely related to the suspicions of co-workers encountered by injured workers who had requested time off work due to their injuries (Tarasuk & Eakin, 1995). Following electrical burns, questions of legitimacy were related to the association between late presentations of associated symptoms (such as motor neuron disease or late amputations) and the initial injury (Mansfield, et al., 2014). Issues of legitimacy related to cowokers’ response to their injury were also reported by participants in this study. For instance, participants felt that their co-workers would question their need for modified duties or time off work following their upper limb injury. Distress related to the reactions of others to their injuries and to the legitimacy that others attributed to their injury was reported by many participants in the current study, suggesting that this source of distress was applicable to those recovering from mild to moderate traumatic upper limb injuries.

Distress relating to the legitimacy of injury has also been reported in studies evaluating supervisory relationships and workman’s compensation and insurance programs (Eakin & MacEachen, 1998; Underhill, 2012). For instance, problematic supervisory relationships may contribute to the experience of bodily sensations as symptoms of injury and lead to injury claims (Eakin & MacEachen, 1998). When the legitimacy of these claims is questioned and not acted upon, the quality of these relationship is further strained and the social environment becomes unhealthy (Eakin & MacEachen, 1998). This scenario was not reported by participants in the current study, possibly because the focus of this study was on traumatic injury, which has an identifiable cause, rather than cumulative trauma conditions such as tendinitis. Others have described the sometimes exhaustive processes that individuals must endure to prove the legitimacy of their illness or injury under a worker’s compensation claim (Phillips, 2012). It is possible that the ‘no fault’ policy of the Accident Compensation Corporation (ACC) in New Zealand (in which claims are paid regardless of cause or location of injury), contributed to this not being an issue for participants in this study. However, it should be noted that issues of legitimacy have been reported following general injuries in New
Zealand as ACC attempts to reduce the number of active claimants in recent years despite the ‘blameless’ nature of this scheme (Butler, Derret & Colhoun, 2011).

Sources of stress related to abstract cognitive concepts

Although the aspects of recovery (such as difficulties with functional tasks and disruption to roles) that created the most disruption to participants’ lives in the early days after injury were the first to come to mind for many participants when queried about sources of distress, many of the stress factors identified in the results of this study represented abstract cognitive concepts. The emphasis on abstract cognitive reactions to injury might be related to the relatively mild severity of the injuries and to the timing of interviews in this study. While earlier studies have focused on distress in either the early days following injury (Grunert, Smith, et al., 1988b; Gustafsson & Ahlstrom, 2004; Gustafsson, et al., 2000) or at a long-term follow-up (Grunert, et al., 1992), this study examined sources of distress after the initial management of the injury was over and patients were established in an outpatient rehabilitation program. Gustafsson & Ahlstrom investigated psychological reactions to hand injuries and for one year after injury and found that problems such as functional impairment, pain, trauma-related distress, mood disorders and negative reactions to the sight of the hand decreased over the first three months and then remained unchanged over the course of a year (Gustafsson & Ahlstrom, 2004). Although pain and physical impairment were a problem for participants in Study III (many of whom were 5-6 months post-injury), these issues were already starting to resolve for many at the time of interview. In contrast, more abstract, cognitive stressors such as questions of legitimacy and issues with identity were becoming more pronounced. These results suggest that the sources of distress may shift to more abstract cognitive issues as the stressors related to physical impairments begin to resolve but before an individual has returned to full functional levels. Clinically, these results imply that hand therapy goals which address these more abstract issues could be collaboratively set with patients and may help to alleviate this distress.
Common sources of distress not found in this study

Two additional issues that are commonly identified in discussions of distress following traumatic upper limb injuries are pain and post-traumatic stress symptoms. Pain was an issue for many of the participants in Study III, but the reason the pain caused distress was distributed across the various themes. For instance, although most participants reported that they experienced pain during their recovery, it was not the actual experience of pain that created distress. In many cases, pain-related distress stemmed from more abstract issues such as lack of knowledge about their injury and the healing process. This ignorance led to fear that the pain they were experiencing was indicative of further damage to their tissues. This fear then resulted in a curtailing of activities in order to avoid further damage, resulting in frustration on the part of the patient. This cycle reflects the fear and avoidance behaviours described as components of pain anxiety (Asmundson, Norton, & Norton, 1999; McCracken, Zayfert, & Gross, 1992) and has been associated with disability in patients with musculoskeletal pain (Hadjistavropoulos, Asmundson, & Kowalyk, 2004) and hand fractures (Keogh, Book, Thomas, Giddins, & Eccleston, 2009). The association between pain anxiety and disability was also apparent in a sample of individuals with a wide range of upper limb injuries within Study I of this thesis (see Chapter 5). In sum, while participants in the current study denied that pain sensations were distressing for them, all participants reported distress related to pain in some capacity.

Another issue frequently measured in studies of psychological distress following traumatic injury is post-traumatic stress (Asmundson, Norton, Allerdings, Norton, & Larsen, 1998; Bear-Lehman & Poole, 2011; Grunert, et al., 1992; Gustafsson, Amilon, & Ahlstrom, 2003). Symptoms of post-traumatic stress include both intrusive symptoms, such as nightmares and flashbacks, and avoidance symptoms, including behavioural symptoms aimed at avoiding reminders of the trauma experience (Koopman, Glassen, Gardena, & Spiegel, 1995). Symptoms of post-traumatic stress have been found in up to 92% of individuals following a severe hand injury (Grunert, Smith, et al., 1988a). These symptoms have also been noted in a smaller percentage of individuals shortly after injury in a study population of people with milder upper limb injuries who nonetheless all required surgical
intervention and inpatient care (Gustafsson, et al., 2000). The experience of post-traumatic stress symptoms was a not strong stress factor for most of the participants in Study III. Only two participants in our sample reported occasional intrusive symptoms such as flashbacks related their trauma experience. The discrepancy between previous findings and the small percentage of those in our study who exhibited symptoms of post-traumatic stress may be due in part to the relatively mild severity of injuries for most of the participants in this study. Although not cited frequently in our study, it is important to identify those individuals who experience these symptoms as they may be in need of additional psychological support.

Relationship of findings to Gustafsson, et al. (2000)

This study has many similarities to the study of sources of distress following severe traumatic upper limb injuries by Gustafsson, et al (2000) (see Table 9.6).

Table 9.6: Comparison of sources of distress with Gustafsson, et al. (2000)

|-------------------------|-----------|
| 1) Uncertainty about function in the future | 1) Uncertainty  
Subthemes: 1) Decreased understanding of injury and process, 2) Trust in healthcare system, 3) Poor communication with healthcare workers, 4) Understanding and impact of pain, and 5) Uncertain future function |
| 2) Practical problems with daily activities | 2) Disruption  
Subthemes: 1) Daily tasks and routines, 2) Leisure pursuits, 3) Boredom, 4) Financial security, 5) Shared responsibility, and 6) Disruption and normal social relationships |
| 3) Being dependent on help from others | 3) Identity  
Subthemes: 1) Fragility, 2) Patient role, 3) Dependence on others, 4) Loss of private self, and 5) Loss of public self |
| 4) Pain | 4) Legitimacy  
Subthemes: 1) Size matters, 2) Visual signs, 3) Self-blame, 4) Reactions of others to the injury, and 5) Seeking initial medical care |
Both studies evaluated stress factors in a sample of individuals who had sustained traumatic upper limb injuries. However, Study III included those with mild to moderate injuries while Gustafsson’s study was limited to those with more severe injuries. Study III was also comprised of a greater number of women (N = 4 of 11), possibly providing a more balanced perspective between men and women (Gustafsson’s sample only contained 1 woman out of 20 participants). Finally, Gustafsson’s study explored these stress factors in the early days following injury while Study III included individuals up to and including 5 months post-injury. These distinctions may have contributed to the differences in sources of stress identified between the two studies (see sections above) and are illustrated in Table 9.5 [See Section 9.2 for comparisons between Study III and Haese (1985).]

**Limitations**

There are some limitations to the applicability of the findings of this study to a wider population. Although I made attempts to ensure that the sample was representative of the general outpatient hand therapy population in terms of age, injury type, occupation, employment, living situation and gender, all participants were resident of a small city on the South Island of New Zealand. As such, these results may not apply to individuals living in more urban or more rural settings. Further larger scale quantitative studies evaluating the prevalence of the stress factors identified in this study in populations from various cultures would provide further information. The application of these findings is restricted to those with mild to moderate upper limb injuries. However, as my contention is that stressors vary in each illness situation and across time within an illness situation, this was
done on purpose. Finally, this study does not look at coping styles; further research examining the relationship between these identified stress factors and coping styles would provide further information on this link (see Chapter 10).

9.7 Chapter Summary
This chapter detailed the design and results of a qualitative study exploring the sources of psychological distress following mild to moderate upper limb injuries. Results indicated that stress factors may be described along four main themes: 1) Uncertainty, 2) Disruption, 3) Identity, and 4) Legitimacy. Some sources of distress, such as uncertainty of future function and disruption to daily tasks and routines, are similar to the results of previous studies exploring the sources of distress following traumatic upper limb injuries. However, other sources, such as legitimacy and disruption to social routines and relationships, have not been previously reported in this population. Further research exploring the prevalence of these sources of distress in a larger population and their relationship to related psychological concepts would help to establish the validity and reliability of these sources of distress following traumatic upper limb injuries. The results of this study may allow clinicians who treat individuals with mild to moderate traumatic upper limb injuries to initiate conversations about sources of distress following injury, to provide more focused support, and to refer to appropriate services for assistance if necessary. These steps may help to alleviate some of the distress experienced during recovery from mild to moderate traumatic upper limb injuries.
Chapter 10

Integration of Quantitative and Qualitative Findings

10.1 Chapter overview

In this chapter, I integrate the findings of all three studies. The three studies in this thesis are: 1) Study I (Recovery-related anxiety and disability following upper limb injury: The importance of context), 2) Study II (Psychological distress after hand injury: An evolutionary concept analysis) and 3) Study III (Sources of distress following minor to moderate traumatic upper limb injury). Findings from the three studies are compared with previous research and theory. Implications of the findings of this research for clinical practice as well as recommendations for further research are discussed.

10.2 Thesis overview and main findings

The primary aim of this thesis was to explore the concept of recovery-related anxiety (later called psychological distress) following mild to moderate traumatic upper limb injuries. My initial interest in this topic arose from what I felt was a lack of congruence between the types of psychological distress I saw in my patients with upper limb injuries and the research I read that addressed psychological reactions to injury. My observations as a clinical hand therapist suggested that anxiety in response to mild to moderate upper limb injuries met these criteria (see Chapter 4):

- The anxiety was a normal reaction to a traumatic injury and the recovery experience.
- This anxiety may present along a continuum from mild to severe
- The severity of anxiety was not necessarily related to the severity of injury
• The predominant presentation of the anxiety was cognitive or affective symptoms.
• The anxiety was not a pathological form of anxiety as described by the DSM-IV (i.e. PTSD or GAD) (American Psychiatric Association, 2000)
• Individuals would recognize and self-report their anxiety as an emotion related to their recovery from a traumatic upper limb injury

In order to gain a comprehensive understanding of this phenomenon, I utilized a pragmatic approach to research (Creswell & Plano-Clark, 2007; see section 2.5) to complete a mixed-methods series of complementary studies that approached psychological distress from diverse perspectives.

Study I (Chapter 5) was a questionnaire study designed to measure the prevalence of general anxiety (trait anxiety) and three forms of recovery-related anxiety (state anxiety, pain anxiety, and post-injury anxiety) and following mild to moderate upper limb injuries and the relationship between these forms of anxiety and self-reported disability. Recovery-related forms of anxiety were assessed by directly relating symptoms of anxiety to the context of recovering from a traumatic upper limb injury. The results of this study indicated that participants reported more recovery-related anxiety than general anxiety. In addition, general anxiety was not correlated with disability while some forms of recovery-related anxiety (pain anxiety and post-injury anxiety) exhibited moderate to high correlations with disability. A regression analysis indicated that all four forms of anxiety could explain 29% of the variance in reported disability, but only post-injury anxiety was able to explain a significant unique portion of the variance in disability (19%). These results suggested that it is important to identify recovery-related forms of anxiety in those with less severe injuries.

Study II (Chapter 8) consisted of an evolutionary concept analysis exploring the concept of psychological distress as an independent concept within the literature relating to traumatic upper limb injuries. Results indicated that the term
psychological distress was rarely used as an independent concept in this research area, instead serving as a label for a category that encompassed several psychological concepts. However, the antecedents, consequences, related terms, and characteristics of psychological distress following upper limb injury as a unique concept were identified. Based upon these results, psychological distress following upper limb injury as an independent concept within this research area was defined as:

A troubling psychological state precipitated by a traumatic upper limb injury that consists of measurable symptoms of psychological disorders, presents along a continuum of severity from mild to severe, and has negative consequences for mental health and recovery from injury.

This definition of psychological distress following traumatic upper limb injuries relies heavily upon symptomatic presentation of distress and furthers the reductionistic view of distress as a form of pathology. In order to progress the concept of psychological distress as a unique, non-pathological concept, I argued that it is necessary to shift the focus of the measurement of this distress away from psychological disorders. One way to do this is to view distress as a relationship between person and situational factors as suggested by Lazarus and Folkman (1984).

Study III (Chapter 9) was a qualitative study that used thematic analysis to identify distressing aspects of recovering from a mild to moderate traumatic upper limb injury. Eleven people who had recently sustained such injuries participated in one-on-one interviews focused on their experience of recovering from upper limb injury. Participant responses indicated that distress was related to four main themes: 1) uncertainty about issues such future function and pain, 2) disruption to daily life and routines, 3) impact on identities as a worker, invulnerable being, and caregiver, and 4) questions regarding legitimacy of the injury. The identification of
distress relating to uncertainty, disruption and identity confirmed previous research exploring sources of distress in those with more severe traumatic upper limb injuries. However, there were certain aspects of each of these sources, such as uncertainty related to inability to anticipate the level of pain induced by physical activity, that were unique to Study III. In addition, distress relating to questions about legitimacy of injury have not been previously reported in those with traumatic upper limb injuries, suggesting that this source of distress might be unique to the experience of recovering from mild to moderate traumatic upper limb injuries.

Taken together, the findings of all three studies suggested that there is merit in the further exploration of psychological distress following traumatic upper limb injuries as an independent concept. There were three other conclusions that appeared across the studies:

1) There are identifiable common sources of distress following upper limb injury, but they may vary slightly depending on severity of injury or timing within recovery process
2) Psychological distress is a common aspect of the recovery experience following traumatic upper limb injuries
3) Sources of psychological distress may be appraised as threatening by some individuals while being perceived as benign by others

10.2.1 Psychological distress as an independent concept

The primary finding of this thesis is that context-specific psychological distress is potentially valuable as an independent concept within the traumatic upper limb injury research. The value of this concept was first suggested by the results of Study I, which indicated that the forms of anxiety most closely related to the context of recovering from a traumatic upper limb injury (pain anxiety and post-injury anxiety) were correlated with self-reported disability while symptoms of state anxiety (which is only temporally associated with the injury) and general
anxiety (which is not associated with a specific context) were not (see Chapter 5). These findings concur with the association between context-related measures of anxiety, such as pain anxiety, and disability found in quantitative research on patients with hand fractures (Keogh, 2010). Results also indicated that context-specific psychological distress might be viewed as a concept in its own right, independent from other forms of recovery-related anxiety (see Chapter 6). For instance, post-injury anxiety was the only form of anxiety that accounted for a significant portion of the variance in disability. Further exploration of post-injury anxiety as an independent concept, therefore, may provide valuable insight into the psychological distress and disability experienced by individuals recovering from traumatic upper limb injuries that is not revealed using tools designed to measure other forms of context-based anxiety such as pain anxiety or state anxiety.

The results of Study II, a concept analysis of psychological distress within the literature on traumatic upper limb injuries, confirmed that there was value in an independent concept of context-dependent psychological distress but suggested that it needed considerable development to be useful. Two authors whose publications were included in the concept analysis defined psychological distress as a general emotional reaction to a specific stressor (Gustafsson, 2002; Lam, 2011). Unfortunately, despite the allusion to psychological distress, Lam (2011) measured psychological distress using tools designed to measure the related concept of PTSD (Gustafsson, 2002 did not measure psychological distress due to the qualitative design of the study). The remaining studies included in the concept analysis used various combinations of measures designed to measure a range of related concepts (e.g. anxiety, depression, PTSD, etc. – see Chapter 8). The disagreement over how to measure psychological distress suggests that it may represent a global concept, but that no single existing concept or measurement tool adequately captures the emotional reaction to injury that researchers are interested in. These findings indicate that there is scope for the development of psychological distress as an independent concept.
Congruent with my findings in Study II, Victorson et al. (2008) argue that the current state of research relating to psychological distress following general traumatic injury is inadequate, largely due to limitations imposed by the tools available to measure it. These limitations include that: 1) no existing single measurement tool captures the full spectrum of patient distress related to their traumatic injury; 2) the information obtained from different tools measures different concepts and is therefore difficult to compare; 3) measuring all components of this concept separately places too much of a response burden on patients; 4) none of the available tools include injury or accident specific item content, which would increase the specificity and relevance of the psychological reaction being measured (Victorson, Enders, Burnett, & Ouellette, 2008). In response to this, Victorson and colleagues proposed a guiding framework based upon clinical notes from interviews and case summaries, a comprehensive literature review and expert advice for the development of a tool (The Injury-Related Distress Index) intended to measure a concept they called *injury-related distress* for people with any traumatic injury (Victorson, et al., 2008). This concept is a composite variable made up of post-traumatic stress, depression, anxiety and pain and includes specific reference to the injury within the phrasing of items (Victorson, et al., 2008). Their work involves the kind of focus on a combination of related psychological disorders (instead of defining psychological distress as a unique concept) that I critique in Chapter 8. However, it highlights need for the development of a standardized definition of psychological distress.

There are three main differences between injury-related distress (Victorson, et al., 2008) and the concept of post-injury anxiety from Study I. First, my approach to post-injury distress was intended to apply to a specific population (those who have sustained mild to moderate traumatic upper limb injuries) while injury-related distress is relevant to individuals who have sustained any traumatic injury. Second, my approach to post-injury anxiety is specifically conceptualized as a form of non-pathological anxiety; injury-related distress refers to symptoms of pathological anxiety disorders such as PTSD, depression and anxiety, implying a
closer association with these related psychological concepts (Victorson, et al., 2008). Thirdly, the measurement development process utilized by Victorson and colleagues for the concept of injury-related distress was much more exhaustive than the development process undertaken for the concept of post-injury distress in Study I. However, the primary aim of Study I was not to develop a novel questionnaire but to assess the prevalence of three forms of recovery-related anxiety following traumatic upper limb injuries (see Chapter 5). The RRAQ was developed out of necessity for this study to assess anxiety directly related to the experience of recovering from an upper limb injury, for which there was no existing measure. Items on the RRAQ were drawn from a literature review and from informal conversations with relevant health professionals. As the results of Study I indicated that post-injury anxiety was prevalent in the study population and that it demonstrated a strong correlation with disability, I decided to pursue the development of this concept in the remainder of this thesis (see Chapters 6-9).

The results of Study III, a qualitative exploration of stress factors following traumatic upper limb injuries, evidenced the context-specificity of the concept of psychological distress. Study III identified several sources of distress that have not previously been attributed to the experience of recovering from a mild to moderate upper limb injury. For example, while feelings of illegitimacy have been associated with other non-visible conditions such as back injuries (Tarasuk & Eakin, 1995) and electrical burns (Mansfield, Stergiou-Kita, Kirsh, & Colantonio, 2014), they have not been reported following mild to moderate upper limb injuries. Within the literature relating to back injuries, these feelings of illegitimacy may be associated with the perceptions of coworkers when returning to work following a work-related accident (Tarasuk & Eakin, 1995). In my sample, the sense of illegitimacy extended to participants’ own feelings about their injuries as well as the way they perceived that family members and friends viewed their injuries. Feelings of illegitimacy following upper limb injuries appeared to be related to the small size of the body parts injured and the perceived disproportionate (compared to the size of injury) level of resulting physical
impairment and distress. This unique stressor has not been reported in studies of those with upper limb conditions such as severe hand injuries or disease processes, possibly due to the different presentations of these conditions. For instance, the presence of scarring or obvious deformity may help to mitigate these emotions in those with severe hand injuries while perceptions associated with the disease itself may result in a different view of the associated impairments in those with diseases such as arthritis or gout (Vamos, White, & Caughey, 1990). Therefore, the distress associated with feelings of shame or illegitimacy regarding traumatic upper limb injuries may be unique to those who have sustained minor or moderate upper limb injuries. As none of the tools used to measure the concepts related to psychological distress would have captured this distress, this finding supports the development of psychological distress as a context-dependent, independent concept.

The context-based view of distress in Study III also revealed some new ways of looking at previously explored forms of distress. For example, in contrast to other studies on related populations, pain-related distress in Study III was generally not related to the experience of pain itself. Instead, it was related to existential issues like loss of identity as a young, healthy person and abstract issues like the uncertainty associated with not understanding the cause of pain (see Chapter 9). In contrast, symptoms of pain anxiety in a community physiotherapy sample (Coons, Hadjistavropoulos, & Asmundson, 2004; Keogh, Book, Thomas, Giddins, & Eccleston, 2009), in patients with hand fractures (Keogh, Book, Thomas, Giddins, & Eccleston, 2009) and in those with musculoskeletal pain (Carleton, Abrams, Asmundson, Antony, & McCabe, 2009) have generally been described in terms of the actual experience of pain. Pain anxiety in these studies typically falls within four domains: cognitive anxiety (i.e. “During painful episodes it is difficult for me to think of anything besides the pain”), escape-avoidance behaviours (i.e. “I try to avoid activities which cause me pain”), fear of pain (i.e. “I dread feeling pain”), and physiological symptoms (i.e. “I become sweaty when in pain”) (Mccracken, Zayfert, & Gross, 1992). Because pain anxiety is typically measured based upon these
domains, the more abstract sources of distress relating to pain found in Study III would not have been revealed using a measurement tool [such as the PASS-20; (McCracken & Dhingra, 2002)] that evaluates pain anxiety based upon these domains. This provides further justification for the value of developing psychological distress following mild to moderate traumatic upper limb injuries as a unique concept.

The development of psychological distress as a context-specific, independent concept has clinical implications as well. For instance, emphasizing the relationship between anxiety symptoms and a recognizable stressor when evaluating psychological distress may make patients more willing to report their distress (or even more able to recognize symptoms of distress in themselves). This was suggested by the results of Study I, in which participants reported higher levels of recovery-related anxiety than general anxiety symptoms. It is also important for clinicians to recognize that sources of distress may be unique to certain injury experiences (Lazarus & Folkman, 1984). For instance, in the case of upper limb injuries, pain anxiety was not necessarily associated with the pain itself, but to issues such as a lack of understanding of the causes and consequences of pain. The common clinical practice of asking a patient how much pain he or she may be experiencing, therefore, will not reveal the extent to which that pain is causing distress or difficulty. Finally, it is possible that reactions to the sources of distress identified in Study III may impact individuals’ behaviours related to seeking treatment for the injury, participating in therapy (e.g. willingness to wear a splint) or returning to work (e.g. remaining off work to rest a structure whilst it is healing). An appreciation of the unique sources of distress in the context of recovery from a mild to moderate traumatic upper limb injury allows clinicians to provide more appropriate support to patients and to anticipate potentially harmful behaviours.
10.2.2 Common sources of distress exist but vary with severity and timing of injury

This thesis confirmed sources of distress that others have identified in related populations and extended this understanding by expanding upon them and substantiating them in a different population. The findings of this thesis suggest that there are sources of distress following traumatic upper limb injuries that are common to many of those who experience these injuries. In Study I, participants with mild to moderate traumatic upper limb injuries were asked to report degree of “worry or bother” related to potential sources of distress following upper limb injuries on the Recovery-related Anxiety Questionnaire. As described in Chapter 9, many of the sources of distress in this questionnaire were drawn from the results of a Swedish qualitative study of stress factors in the early days of recovery following traumatic upper limb injury (Gustafsson, Persson, & Amilon, 2000). (See Table 10.1)

Table 10.1: Confirmation of common sources of distress

<table>
<thead>
<tr>
<th>Gustafsson, et al. (2000) themes</th>
<th>Study III themes</th>
</tr>
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<tbody>
<tr>
<td>Practical problems with daily activities</td>
<td>Disruption to daily tasks and routines</td>
</tr>
<tr>
<td>Uncertainty of future function</td>
<td>Uncertain future function</td>
</tr>
<tr>
<td>Being dependent on others for help</td>
<td>Dependence on others</td>
</tr>
<tr>
<td>Involuntary inactivity</td>
<td>Boredom, Disruption to roles</td>
</tr>
<tr>
<td>Appearance of hand</td>
<td>Visual signs, Size matters</td>
</tr>
</tbody>
</table>

Results of Study I show that many of the participants experienced “Quite a bit” or “Extreme” worry or bother related to the sources of stress identified by Gustafsson, et al. (2000), confirming that these sources of distress applied to the population in our study as well. For instance, more than 40% of participants found
“Problems with daily tasks,” “Dependence on others,” or “Boredom – involuntary inactivity” to be strong sources of distress.

The congruence between the sources of distress identified by Gustafsson et al. (2000) and the findings of Studies I and II are important, as the population of Gustafsson’s study was slightly different. In particular, all of the participants in Gustafsson et al.’s (2000) sample required hospitalization, suggesting that the severity of injury in this sample was greater than the average severity of injury in the sample for Studies I and II. As such, it appears that there are identifiable aspects of recovering from an upper limb injury that may be appraised as stressful by many of those who have undergone this experience, regardless of the severity of injury.

It is possible that the results of Study III were in part shaped by my knowledge of Gustafsson’s results when I planned the interview schedule for Study III. In particular, the final portion of the interview asked participants to review of list of stress factors identified by Gustafsson (2000) and Grunert (1988a,b) (see Chapter 9) and to comment on them based upon their own experiences. However, the semi-structured design of interview questions, the focus of the interview on participants’ own experiences, and my conscious attempt to avoid leading participants’ answers suggest that this influence was not substantial. In addition, while the results of Study III confirmed Gustafsson’s results, they also suggested that sources of distress differ for those with less severe injuries.

However, there were also some differences between Gustafsson’s results and the findings of Studies I and II. In particular, two sources of distress found in Gustafsson’s study, the experience of pain and the trauma event itself, did not emerge as strong themes in Study III. Further, In Study I, only 20% of participants reported that having pain created “Quite a bit” or “extreme” worry or bother on the Recovery-Related Anxiety Questionnaire (RRAQ). Although the pain experience was interwoven within the themes of Study III, pain itself did not present as a
substantial problem for most of my participants. Instead, distress related to pain was more closely associated with uncertainty about function and legitimacy of injury. This is in contrast to discussion about pain in Gustafsson’s (2000) study, which centered largely around the actual experience of pain, pain management and analgesic use. It is possible that this difference can be also attributed to the difference in injury severity represented by participants in Studies I and III when compared to the study sample in Gustafson et al. (2000). As some of the participants in Studies I and III sustained relatively minor injuries (i.e. finger sprains and wrist sprains), it is probable that the pain they experienced was not as intrusive as the pain experienced by the sample in Gustafsson’s study. It is also possible that the later stage of recovery represented in our sample meant that the acute experience of pain had resolved and that chronic pain was less problematic for Study III participants.

The trauma experience itself was also not a considerable issue for all but one of the participants in Study III. While this difference is again suggestive of the difference in severity of injury between the two samples, it may also reflect the different stages of recovery at which the interviews took place. Although Gustafsson’s participants were interviewed between 8 and 21 days following injury, participants in Study III were interviewed between 4 weeks and 6 months after injury (average about 4 months). It is possible that the later stage of recovery represented the Study III sample meant that participants had had more time to process the injury experience and, therefore, the experience itself no longer represented a threat. Time as an explanation of the difference is in line with Horowitz’s model explaining reactions to stressful events, which states that the memory of a stressful event is held within active memory until the individual has integrated this memory with an “inner model” of the world and self. At this time, the memory is then transferred into inactive memory and the repeated and intrusive thoughts that typify the inactive memory phase cease to occur (Horowitz, 1997). At approximately 4 months post-injury, the memory of the injury
experience may have already been processed into inactive memory in the majority of participants in Study III.

There were two strong themes in Study II, legitimacy of injury and impact of injury on identity, which did not appear in Gustafsson's results. Although it could also be explained by differences in severity of injury between the samples (i.e. more severe injuries may be more obvious to the public due to the presence of scarring, bandages, etc.), this divergence could be related to the later stage of recovery from injury in our sample. Many of the issues surrounding legitimacy of injuries in Study III were related to public perceptions of appearance of the injury and were frequently associated with return to work. Issues of legitimacy are reported with other injuries, such as back injuries, in which participants report a struggle to establish the credibility of their injuries to supervisors, colleagues, and workman’s compensation organizations (which provide similar wage benefits to ACC) (Tarasuk & Eakin, 1995). As participants in Gustafsson’s study were interviewed at an early stage of recovery, they may not have experienced some of the public reaction to their injuries that participants in Study III had experienced and may not have questioned about returning to work yet.

The impact that injuries have on identity also appears to occur later in the recovery process, possibly explaining why it was a strong theme in Study III but did not emerge in Gustafsson's (2000) results. Distress related to a loss of identity was a strong theme in Study III, confirming results of other studies on the long-term impact of upper limb injuries on life roles. Schier & Chan (2007) found that individuals with hand injuries reported issues related identity loss approximately one year following severe hand injuries. Their qualitative study focused on the changes to three individuals’ roles as caregivers, workers, and spouses following hand injuries. Results indicated profound changes to roles following injury, although each participant reported the impact that these changes had on their identity differently. For instance, while one participant found it distressing that he was unable to maintain his role as the primary breadwinner for his family, another
reported that her inability to teach gymnastic moves to her students impacted her view of herself (Schier & Chan, 2007). Two participants in Study III reported distress related to their diminished caregiver roles at 3 months and 6 months following injury, suggesting that these issues may emerge earlier than 1 year post-injury.

Similar research has found that loss of identity as a worker following extended absence from work creates distress following upper limb injuries (Bamford & Walker, 2010). In particular, one participant in Bamford & Walker’s (2010) study viewed her return to work at two months post-injury as a milestone in her rehabilitation and attributed “feeling like [her] own person” (p. 56) again to this return. Many of the employed participants in Study III, who were between 9 weeks and 6 months post-injury, described acute distress at losing their identities as productive members of the work culture. Although participants in Gustafsson’s (2000) study reported distress relating to work, they did not express distress regarding a loss of their identity as a worker. These results suggest that distress relating to issues of identity may not be apparent in the immediate aftermath of injury; this source of distress may only emerge as recovery progresses and the impact of the injury on multiple aspects of life becomes apparent.

**10.2.3 Psychological distress following traumatic injury is common**

The three studies in this thesis revealed that psychological distress is a common experience following traumatic upper limb injuries. The most direct evidence comes from Study I, in which all participants reported some degree of distress on at least one of the measures (See Chapter 5, Table 5.2). This finding is reflected in those articles that report prevalence statistics in Study II. For instance, Grunert reports that 94% of patients with severe hand injuries report symptoms of distress in the early days following injuries (Grunert, et al., 1988) while Jaquet reports moderate to severe psychological symptoms in 64% of those with severe laceration injuries to the wrist one month after injury (Jaquet, et al., 2005). In Study III, the frequency of words and phrases suggesting distress used during the
interviews suggests that distress was an integral part of the recovery process for all the participants. The prevalence of distress noted in all three of these studies is an important issue for clinicians treating those with upper limb injuries. It appears that psychological distress is a common reaction to traumatic upper limb injuries and a targeted discussion relating to sources of distress in individuals may facilitate recovery and reduce distress.

The results of the studies described in this thesis could serve as a starting point for clinicians in initiating conversations about these reactions in two ways. First, as mentioned previously, the results of Study I suggest that participants may be more willing to talk about distress relating directly to aspects of recovery (when compared to symptoms of distress not related to a specific source). Initiating conversations by asking participants in the context of a specific aspect of recovery may encourage participants to reveal any distress they might be experiencing. Second, the sources of distress identified in Study III could form the basis for these conversations within a structured clinical interview or as more informal prompts during conversations in therapy sessions.

10.2.4 Psychological distress is individual in nature

Although the findings of my research suggest that there are common sources of distress within the experience of recovering from a traumatic upper limb injury, results also highlight that the experience of distress during recovery from upper limb injury varies by individual. This is in keeping with the nature of distress described by Lazarus and Folkman (1984), who argue that while certain aspects of a situation may have the potential to create distress, it is an individual's appraisal of a context that ultimately determines whether or not that particular situation is stressful for him or her. While there were common sources of distress noted between individuals in Study III, each participant placed varying degrees of emphasis on different sources of distress and each reported different combinations of these sources of distress unique to their situations. No two participants in Study III reported exactly the same number or combinations of
sources of distress. This is congruent with the results of Study I, in which the ranges of reported distress ran from almost no distress to high levels of distress on all measures (see Table 5.2). It is also reflective of the findings of similar qualitative studies on the experience of recovering from upper limb injuries (Bamford & Walker, 2010; Chan & Spencer, 2004; Gustafsson, et al., 2000), in which each participant reported differing levels of distress related to the varying sources of distress. Thus, it is important for clinicians to explore sources of distress with individual patients in order to tailor psychological support (and potential material support such as referral to appropriate services like psychology) to each individual's experiences.

10.3 Clinical implications

The results of the research reported in this thesis have a number of implications for healthcare professionals. Clinicians will likely recognise that reports of distress by patients may initially focus on the practical difficulties associated with physical impairments and disrupted routines. Interventions and education designed to address difficulties with functional tasks and leisure pursuits are typically incorporated into hand therapy goals from an early stage. However, the distress engendered by these disruptions to normal life may not be adequately addressed in a busy clinic environment. In addition, boredom, financial security, and impact on normal social relationships may only be mentioned briefly during treatment sessions. It may be useful for healthcare professionals to actively pursue conversations about these issues periodically throughout the rehabilitation course and to provide reassurance that this distress is common. Ideally, a patient may be matched with someone who has recovered from a similar injury and may be able to share his or her experiences (Ramsey, 1992). However, this is difficult to facilitate in today's medical environment due to confidentiality issues. Issues relating to financial security may require facilitation of a conversation with an ACC (see Footnote in Section 1.1 for a description of the ACC scheme in NZ) case
manager to ensure appropriate benefits are being paid or to a social worker, who may be able to advise on other available financial aid services.

Further gentle probing about sources of distress in conversations with patients may reveal distress related to more abstract issues like uncertainty about future function. In this research, uncertainty was often strongly related to poor communication with healthcare professionals and a lack of information about the injury and processes. Unfortunately, there is often some uncertainty regarding the diagnosis (Jenkins, Slade, Huntley, & Robinson, 2008) or final functional outcome (Jaquet, et al., 2001) following traumatic upper limb injuries. However, hand therapists can describe to patients the complex anatomy of the upper limb and how even a minor interruption to this balance (i.e. in the form of scar tissue adhesions) can have significant implications (Tang, 2007). This may help patients to understand how their actions cause pain and whether the pain they experience is indicative of further tissue damage or is simply an indication of increased swelling due to activity. The level of detail provided should be tailored to individual needs and desire for information and should be presented in clear, jargon-free language. Therapists should also ensure that patients have a clear understanding of how the paperwork and processes for New Zealand’s Accident Compensation Corporation (ACC) works (or provide contact information and encourage patients to get in touch with ACC).

The information that therapists and other healthcare professionals supply to patients about their injuries may also help to alleviate the feelings of illegitimacy described by participants in Study III. The issues related to this theme were largely related to participants’ sense that their injury was insignificant and therefore should not be causing the degree of functional difficulty and/or disruption to their lives that it was. Educating patients about the reasons that their injuries required lengthy healing times, complex splints or therapy protocols, and gradual return to resistive activities may alleviate some of the distress related to legitimacy by giving patients the power to explain their limitations. In my practice, I have also
found that providing a simple visual sign of injury (such as a light compressive wrap) in the early days of return to work can help to satisfy co-workers skepticism of the ongoing healing of the injury. This was confirmed as a useful strategy by one participant in Study III, who reported that he regularly wore a piece of compressive wrap on his injured finger as a visual reminder of his injury for coworkers. Although it is important not to overstate the seriousness of an injury to avoid encouraging hypervigilance of bodily symptoms, healthcare professionals may also validate the legitimacy of mild to moderate upper limb injuries by avoiding making light of the injury or making jokes about the injured body part. While these attempts to lighten the mood may alleviate distress for some, others may take offense and it is not possible to predict how patients will react.

Finally, it is also important for clinicians to appreciate that injuries may impact patients’ self-image and provide encouragement to maximise participation in valued roles and tasks within safe limits. For instance, one participant in Study III spoke at length about his identity as someone who enjoyed participating in risky activities. However, he had sustained his injury while mountain biking and expressed some hesitancy about returning to the same level of mountain biking. From the perspective of a therapist, encouraging this person to continue to participate in this valued activity while providing guidance regarding the safety of participation at various points in the recovery (i.e. discussing ways in which the activity could be graded from less rigorous to more rigorous) would assist this individual to retain the sense of identity that this activity imparts. Approaching patients from a biopsychosocial (BPS) perspective may also limit the assumption of the “patient role.” For instance, one participant in Study III reported that his physiotherapist’s approach to him as a human being first and as a thumb injury second made him feel valued as a person. Avoiding references to patients as “the thumb,” or “the wrist fracture” in conversation with colleagues may help to reinforce the holistic approach to individuals within the BPS model.
10.4 Boundaries of this research

The research presented in Studies I and III focused on individuals with mild to moderate traumatic upper limb injuries within an urban centre in New Zealand. Findings of these studies are most likely to be transferable to those who live within a similar urban area. However, it is not unreasonable to expect that these findings would be congruent with findings of other communities in New Zealand and overseas. Another limit to transferability is my theoretical position that the psychological distress experienced by participants in the studies presented in this thesis is specific to the context of recovering from mild to moderate traumatic upper limb injuries. It is expected that many of the findings in this thesis would be relevant to those with similar conditions (such as non-traumatic upper limb injuries or traumatic injuries found elsewhere in the body). However, the specific contexts of those conditions might vary from that of an individual recovering from a mild to moderate traumatic upper limb injury (for instance, the timeframe for recovery, the uncertainty of diagnosis or the functional limitations associated with a lower limb injury might create different sources of distress for individuals). Therefore, while researchers/clinicians in other contexts might find resonance with some of the findings, it is important to evaluate distress found in those with these conditions within the specific contexts of those conditions. Limitations specific to each study are presented in Chapters 5, 8 & 9.

10.5 Future directions for research

The results of this research suggest that context is an important variable to consider when measuring or exploring psychological distress. The Recovery-Related Anxiety Questionnaire (RRAQ) was developed specifically to measure context-based psychological distress following traumatic upper limb injuries. However, further testing of the psychometric properties of the RRAQ is required in order to make this a useful research tool. Study I provided preliminary evidence for the content validity of this tool and face validity was established through conversations with hand therapy professionals and patients with upper limb
injuries. The results of Study III confirmed the relevance of most of the items on the RRAQ to mild to moderate upper limb injuries, but also suggested that there are other items that could be included to provide a more comprehensive coverage of the sources of distress following mild to moderate upper limb injuries. Further research on a revised version of the RRAQ based on the results of Study III would be useful in order to improve the content validity of the RRAQ, test the reliability of this tool, determine the potential of this tool to measure changes in distress over time, and examine the factor structure of the revised RRAQ. Exploration of the usefulness of the scoring of the RRAQ (in particular, the scoring of N/A answers as “0”) may also serve to improve the applicability of a total RRAQ to more participants. Studies intended to explore the validity of the RRAQ in related patient populations (like upper limb idiopathic pain, repetitive strain injuries, severe injuries upper limb injuries, or diseases of the upper limb such as gout and arthritis) or in different cultural settings would also be useful.

Another research opportunity is to continue to develop the concept of psychological distress as an independent concept within this field. A qualitative study investigating hand therapists’ perceptions of psychological distress would provide insight into the assumptions that hand therapists hold about distress following mild to moderate traumatic upper limb injuries. Previous health-related research has indicated that healthcare professionals’ assumptions about the priorities and motivation of patients with chronic health conditions such as rheumatoid arthritis (RA) may influence the clinical behaviour of the health professionals (John, Hale, Treharne, Carroll, & Kitas, 2008). For instance, clinicians may be less likely to promote cardiac event risk management strategies to patients with RA due to their assumptions that these strategies are not a priority for this clinical group (John, et al., 2008). It is possible that hand therapists have assumptions about the sources of distress following mild to moderate upper limb injuries that are different than those which were identified by current/former patients in Study III. These assumptions may prevent hand therapists from adequately addressing the sources of distress in their patients.
The relationship between psychological distress and outcomes such as disability and pain also warrants further investigation. Although a number of studies describe an association between disability and psychological distress following traumatic upper limb injury, limitations in study design such as retrospective sampling (e.g. Cheung et al., 2003; Jaquet, et al., 2002; Jaquet et al., 2005) make it difficult to determine the direction of this relationship. Further research employing prospective designs with strong sampling techniques would help us to understand the nature of the relationship between psychological distress and outcomes such as disability, pain, and quality of life.

Another opportunity lies in exploring the relationship between psychological distress and positive outcomes following upper limb injuries. In Study III, some participants reported positive outcomes, such as feeling closer to their partners, from their experiences with a traumatic upper limb injury. Positive outcomes following traumatic upper limb injuries have been mentioned briefly in the literature; for example one participant in Chan & Spencer’s (2004) qualitative study of recovery following upper limb injuries reported that he had "become a lot more patient" (p. 133). However, further exploration of the association between psychological distress and positive outcomes following traumatic upper limb injury would serve to further develop the concept of psychological distress in this context.

Finally, I did not explore the relationship between distress and coping styles. It is possible that the implementation of various coping strategies may alter individuals’ appraisals of the recovery experience as distressing. Previous research suggests that individuals with severe traumatic hand injuries use up to 11 different types of coping strategies, including both emotion-focused and problem-focused strategies, in dealing with their injuries (Gustafsson, Persson, & Amilon, 2002). For instance, when coping with practical problems created by their injuries, participants used strategies like "distancing," "accepting the situation," and "seeking social support" (Gustafsson, Persson, & Amilon, 2002). It is possible that
these strategies were present in the interview data from Study III; however, analysis of coping strategies was beyond the scope of this thesis. Gustafsson (2002) did not specifically link coping strategies to outcomes following these injuries. Desmond (2007), on the other hand, found that coping strategies were a significant predictor of psychosocial adaptation following traumatic upper limb amputations. In particular, that avoidant coping mechanisms were associated with psychological distress and poor adjustment (Desmond, 2007). Further study of the interaction between coping and distress in those with minor to moderate traumatic upper limb injuries would provide greater insight into variation seen in psychological reactions to upper limb injuries over time and between individuals.

10.6 Conclusion
This thesis explored the experience of psychological distress following mild to moderate traumatic upper limb injuries. Phase I of this thesis focused on the prevalence of recovery-related anxiety and the relationship between anxiety and disability (see Chapters 3-5). Results indicated that recovery-related anxiety was common following minor to moderate upper limb injuries and that these forms of anxiety were closely linked to disability. However, a careful examination of the concept of anxiety revealed that another concept, psychological distress, more closely resembled the type of psychological reaction I had witnessed in my patients (see Chapter 6). Therefore, Phase II included two studies that explored the concept of context-dependent psychological distress (see Chapters 8 and 9). Study II, a concept analysis, explored the use of the term psychological distress within the traumatic upper limb literature (see Chapter 8) while Study III explored the experience of distress following traumatic upper limb injuries from the perspective of those who had recently sustained such injuries (see Chapter 9).

Taken as a whole, my findings suggest that viewing psychological distress following traumatic upper limb injuries within the context of the experience of the injury has important implications for treatment and research. The shift towards viewing distress within the context of an event allows for a broader view of
distress as a normal reaction to injury. This view creates an opportunity for clinicians to explore why their patients are experiencing distress rather than how that distress is manifested. The implications of this shift in knowledge are considerable, particularly for those involved in the treatment of individuals with traumatic injuries. Most importantly, this vantage point gives clinicians information about sources of distress (such as uncertainty related to lack of understanding about injury or rehabilitation process, difficulty with functional tasks and disruptions to roles, feelings of identity loss due to treatment by healthcare professionals as a diagnosis or number, and questions regarding the legitimacy of their injury) that they are in a position to do something about. This view also promotes the portrayal of psychological distress as a “normal” reaction to identifiable stressors rather than as a psychological state consisting of symptoms, however mild, of named psychiatric disorders. These two findings directly address the goals of this thesis: to explore psychological distress as a non-pathological psychological reaction to traumatic injury.
References


Dixon, D., Johnston, M., McQueen, M., & Court-Brown, C. (2008). The Disabilities of the Arm, Shoulder and Hand Questionnaire (DASH) can measure the impairment, activity limitations and participation restriction constructs from the International Classification of Functioning, Disability and Health (ICF). BMC Musculoskeletal Disorders, 9, 114.


Roth, H. P. (1955). The peptic ulcer personality. *AMA Archives of Internal Medicine, 96*(1), 32-43.


Underhill, E. (2012). “We only supply fully fit workers to suit our clients’ need” - Injured labour hire workers and their return to work experience. High Road or Low Road, 533.


Appendix A

Study I Forms and Ethical Approval Documentation

Appendix A1: Ethical approval for Study I
Appendix A2: Ethical approval extension 1
Appendix A3 - Ethical approval extension 2
Appendix A4  Māori consultation Study I
Appendix A5  Consent form for Study I
Appendix A6  Participant information sheet Study I
Appendix A7  Invitation letter Study I
Appendix A8  Participant questionnaire Study I
Appendix A1: Ethical approval for Study I

Health and Disability Ethics Committees

Lower South Regional Ethics Committee

27 May 2010

Ms Elizabeth Maynard
10 Glenpark Avenue
Marshall
Dunedin 9011

Dear Elizabeth,

Ethics ref: LRS/MG/EXP/013
Study Title: Prevalence and impact of anxiety following recently acquired injuries to the hand.
Investigator: Ms Elizabeth Maynard, Dr E Jean C Hay-Smith

The above study has been given ethical approval by the Chair of the Lower South Regional Ethics Committee.

Certification
The Committee is satisfied that this study is not being conducted principally for the benefit of the manufacturer or distributor of the medicine or device in respect of which the trial is being carried out.

Accreditation
The Committee involved in the approval of this study is accredited by the Health Research Council and is satisfied to operate in accordance with the Operational Standard for Ethics Committees, April 2006.

Final Report
The study is approved until 1 March 2011. A final report is required at the end of the study. The report form is available on http://www.ethicscommittees.health.nz and should be forwarded along with a summary of the results. If the study will not be completed as advised, please forward a progress report and an application for extension of ethical approval one month before the above date.

Requirements for SAE Reporting
The Principal Investigator will inform the Committee as soon as possible of the following:
- Any serious adverse events occurring during the study in New Zealand which result in the discontinuation of the study
- Any serious adverse events occurring outside New Zealand which are considered related to the study medication

Acknowledged by the RNZ and Ministry for Health

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All SAE reports must be signed by the Principal Investigator and include a comment on whether he/she considers there are any ethical issues relating to this study continuing due to this adverse event. It is assumed by signing the report, the Principal Investigator has undertaken to ensure that all New Zealand investigators are made aware of the event.

Amendments

All amendments to the study must be submitted to the Committee prior to their implementation, except in the case where immediate implementation is required for reasons of safety. In such cases, the Committee must be notified as soon as possible of the change.

Please quote the above ethics committee reference number in all correspondence.

The Principal Investigator is responsible for ensuring any other study sites of approvals and all other correspondence with the Ethics Committee.

It should be noted that Ethics Committee approval does not imply any resource requirement or administrative facilitation by any healthcare provider within whose facility the research is to be carried out. Where applicable, authority for this must be obtained separately from the appropriate manager within the organisation.

We wish you well with your study.

Yours sincerely

Anna Paris
Lower South Regional Ethics Committee Administrator
dl (03) 474 9607
fax (03) 474 9600
Email: anna.paris@mch.govt.nz
Appendix A2: Ethical approval extension 1

1 June 2011

Ms Elizabeth Mayland
110 Glenpark Avenue
Maryhill
Dunedin 9011

Dear Ms Mayland

Ethics ref: LRS/10/EXP/013 (please quote in all correspondence)
Study title: Prevalence and impact of anxiety following recently acquired injuries to the hand, wrist or elbow

Thank you for your letter dated the 22nd of May 2011 relating to the above named study. This documentation has been reviewed and noted by the Chairperson of the Multi-region Ethics Committee under delegated authority.

Noted Documents

- Extension of Data Collection until 1 September 2011.

Please do not hesitate to contact me should you have any queries.

Yours sincerely

[Signature]

Awhina Rangiwhai
Administrator
Lower South Regional Ethics Committee
Email: lowersouth_ethicscommittee@MOH.govt.nz
Appendix A3: Ethical approval extension 2

Health and Disability Ethics Committees

14 April 2011

Ms Elizabeth Mayland
110 Glenpark Avenue
Maryhill
Dunedin 9011

Dear Ms Mayland -

Ethics ref: LRS/10/EXP/013 (please quote in all correspondence)
Study title: Prevalence and impact of anxiety following recently acquired injuries to the hand, wrist or elbow

Thank you for your letter of 26 January 2011 requesting an extension to this study. This extension has been approved by the Chair of the Committee.

We apologise for the delay in responding.

Yours sincerely

[signature]

Rohan Murphy
Administrator
Lower South Regional Ethics Committee
Email: lowersouth.ethicscommittee@moh.govt.nz
Appendix A4: Māori consultation Study I

Ngāi Tahu Research Consultation Committee
Te Komiti Rakahau ki Kai Tahu

18052016 – 06
Wednesday, 10 May 2016

Dr Trehane
Psychology
Canadian

Not for Dr Trehane

Topic: Impact of emotional distress on recovery from upper limb injury.

The Ngāi Tahu Research Consultation Committee (the Committee) met on Tuesday, 10 May 2016 to discuss your research proposal.

By way of introduction, this response from the Committee is provided as part of the Memorandum of Understanding between Te Rūnanga o Ngāi Tahu and the University. In the statement of principles of the Memorandum, it states “Ngāi Tahu acknowledges that the consultation process outlined in this policy provides no power to veto by Ngāi Tahu to research undertaken at the University of Otago”. As such, this response is not “approval” or “endorsement” for the research, rather, it is a mediated response from a Ngāi Tahu-appointed committee. This process is part of a number of requirements for researchers to undertake and does not cover other issues relating to ethics, including methodology; they are separate requirements with other committees, for example the Human Ethics Committee, etc.

Within the context of the Policy for Research Consultation with Māori, the Committee issues consultation on the content of research defined by Justice McCracken:

"Consultation does not mean negotiation or agreement. It means, setting out a proposal, not fully developed, open, expertly informed, in a way that relevant information upon which the proposal is based; listening to what the others have to say with an open mind (so that there is even to be persuaded against the proposal); understanding that task in a positive and not confrontational manner. Reaching a decision that may or may not alter the original proposal."

The Committee notes this is research from the Otago District Health Board.

The Committee considers the research to be of importance to Māori health.

As this study involves human participants, the Committee strongly encourages that ethnicity data be collected as part of the research project. That is, the questions on self-identified ethnicity and consent these questions are continued in the 2006 census.

The Committee notes the researchers have identified that, “Māori adults also have unintentional injury hospitalization rates of 1.5 times those of non-Māori adults”, acknowledged by the Committee.
The Committee recommends care and sensitivity is used in the process of exclusion.

The Committee suggests dissemination of the research findings to Māori health organisations regarding this study.

We wish you every success in your research and the Committee also requests a copy of the research findings.

This letter of suggestion, recommendation and advice is current for an 18 month period from Tuesday, 18 May 2010 to 18 November 2011.

The recommendations and suggestions above are provided on your proposal submitted through the consultation website process. These recommendations and suggestions do not necessarily relate to critical issues with the research including methodology. Other committees may also provide feedback in these areas.

Nīhau mō te-

Mark Brunning
Kaimakauaroa Rangahau Māori
Ezikāhia Rangahau Māori
Research Director
Te Whare Whānagihō Oranga
Ph: 464 470 4718
email: mr.brunning@otago.ac.nz
Website: www.otago.ac.nz
Appendix A5: Consent form for Study I

Consent Form for Participants

Study: Emotional impact of hand, wrist and elbow injuries

I have read the Information Sheet dated 1/2/11 which describes this study and briefly discussed the study with a hand therapist or physiotherapist. I understand the purpose of the study and the type of information that I will be asked to provide on the questionnaire. I have had the opportunity to discuss any concerns or issues with either my therapist or the researcher involved in the study (Beth Mayland) and I am satisfied that all my questions have been answered. In particular, I understand that my decision to participate or not participate will have no impact on my treatment for my hand or arm injury at the Outpatient Physiotherapy Department.

I also understand that:

• My participation in the study is entirely voluntary.

• I am free to withdraw from the study at any time without any disadvantage or impact on my therapy.

• I have had the opportunity to use whānau support or have a relative or friend help me ask questions and understand the study.

• In the unlikely event that I become distressed by thinking about my injury when
reading these questionnaires, I can discuss these issues with my therapist and may be referred to a counsellor for further treatment if I wish.

- Any personal identifying information (name, NHI number, injury type) will be coded and only Dr. Gareth Treharne will have access to this information. I understand that Beth Mayland will not be able to match my survey responses with my name or NHI number at any time.

- Any raw data (answers to the questionnaires) on which the results of the study depend will be retained in secure storage (a locked cabinet) for 10 years, after which they will be destroyed.

- I can request a copy of the results of the study after it is completed.

- The results of the study may be published and will be available in the University of Otago Library (Dunedin, New Zealand) but every attempt will be made to preserve my anonymity.

- If I do have any questions, I can contact Beth Mayland (researcher) between the hours of 8:00am and 5:00pm Monday through Friday at (03) 454 7945.

I agree to take part in this study.

Please also indicate whether you are willing to be contacted in the future to participate in an interview regarding your experiences recovering from a traumatic hand, wrist or elbow injury.

YES □ NO □

____________________________________________
(Signature)

___________________________________ _______________________
(Printed Name) (Date)

This study has been approved by the Lower South Regional Ethics Committee.

Reference Number: LRS/10/EXP/013 Date: 1/2/11
Emotional Impact of Traumatic Injury to the Hand, Wrist or Elbow

Investigators
Beth Mayland, Occupational Therapist/Hand Therapist
Gareth Treharne, Lecturer, Department of Psychology
Jean Hay-Smith, Senior Lecturer, Department of Women’s and Children’s Health

INFORMATION SHEET FOR PARTICIPANTS

Consent Form Date: 1.2.11

Thank-you for your interest in this study. This information sheet will tell you what we are planning to look at and what your experience would be like if you decide to participate. Please read all of the information carefully before you decide whether
or not you want to be involved. If you do decide to participate, we thank you for your time and your thoughts.

Please note that you do not have to take part in this study. If you decide not to participate, there will be no disadvantages to you of any kind. Your therapy will be the same as it would be if you had decided to participate.

**Aim of the project**

The aim of this project is to evaluate how much emotional impact an injury to the hand, wrist or elbow may have on an individual. We are particularly interested in how much stress you are experiencing from your injury and in what might be causing that stress (i.e. loss of income, difficulty completing daily tasks, or pain). This study is being completed as part of the thesis requirements for a Master of Science degree.

**What types of participants are being sought?**

We will be asking individuals between the ages of 18 and 80 who have injured their hand, wrist or elbow within the past 8-12 weeks and who are able to complete written questionnaires in English to participate. You will not be asked to participate if:

- You have experienced a mental health condition (like post-traumatic stress disorder or an anxiety disorder)
- You have an ongoing upper limb problem caused by something like repetitive strain or an inflammatory disease like rheumatoid arthritis
- Your date of injury was more than 3 months ago

**What will you be asked to do if you participate?**

If you do decide to take part in the study, you will be given a questionnaire to fill out in the Outpatient Physiotherapy Department. The questions will include some basic information like which hand you normally write with and how your injury
occurred. There will also be questions about your mood, how much of an impact your injury has had on your life, and how well you feel you are able to complete daily activities at this time. Most questions will involve simply ticking a box. If you are unable to write and need assistance, you are welcome to ask a relative or friend to help or we can provide that assistance for you.

The questionnaire should take you about 15-20 minutes to complete. If possible, we will find you a private area to fill them out at the Outpatient Physiotherapy Department. You will then give your consent form and the sealed envelope with your answers to the reception staff and they will place it into a box in a secure location. If you prefer, we will provide you with a stamped envelope and you make take the questionnaires home and return them to us within 1 week.

With your permission, the investigators will also access your medical records only to obtain relevant information about your current injury.

**Benefits of the study**

There are no direct benefits to you for participating in this study. However, we hope that the information gained in this study will give health professionals a better idea about which aspects of recovery from a traumatic upper limb injury are most stressful to people so that we can help to address these issues better in the future.

**Risks of the study**

There is a small risk that you may become upset by thinking about the impact that your injury has had on your life or about the anxiety that you may experience.

**Can participants change their mind and withdraw from the study?**

You may change your mind and withdraw or cease participation at any point in the study without any disadvantage to you.
**What information or data will be collected and what use will be made of it?**

We will be collecting information about your background (e.g., age, ethnicity) and type of injury in order to describe the participants involved in the study. We will also collect information about your mood, what types of things, if any, may be causing stress during your recovery, the impact of your injury on your lifestyle and your ability to complete functional tasks (e.g., cooking, washing).

All data will be stored in such a way that only the investigators in the study will be able to access it. Note that participant information will be coded so that the identity of each individual will only be matched to the responses by Dr. Gareth Treharne. The results of the study may be published, but no material that could personally identify you will be used in any reports on this study. You are welcome to request a copy of the results of the project.

**If I need someone to help me read the questionnaires, is that OK?**

You may have a friend, family member, or whānau support help you read through the information and/or the study questionnaires to help you to understand the benefits and risks of the study.

If you have any other questions or concerns about this study, you may also contact a Health and Disability Services Consumer Advocate at (03) 479 0265 or free phone at 0800 33 77 66. They can also be reached at free fax 0800 2787 7678 (0800 2 SUPPORT) or by email at [advocacy@hdc.org.nz](mailto:advocacy@hdc.org.nz).

If you have a concern or issue that is Māori specific, please contact Linda Grennell at 0800 377 766.

**Compensation**

You will not receive any monetary compensation for participating in this study. In the unlikely event of a physical injury as a result of your participation in this study, you will be covered by the accident compensation legislation with its limitations. If
you have any questions about ACC, please feel free to ask the researcher before you agree to take part in this study.

**Where can I get more information about the study?**

Beth Mayland (co-investigator)  
Occupational Therapist/Hand Therapist  
& Masters Degree Candidate  
Physiotherapy Outpatient Department  
Dunedin Hospital  
Tel (wk) 03 474 7945  
Email mayel636@student.otago.ac.nz

Dr. Gareth Treharne  
Lecturer  
Department of Psychology  
University of Otago  
PO Box 56, Dunedin  
Tel (wk) 03 479 7630  
Email gtreharne@psy.otago.ac.nz

**Statement of approval**

This study has received ethical approval from the Lower South Regional Ethics Committee, Ethics reference number LRS/10/EXP/013.
May 2010

Dear Study Participant:

Thank-you very much for your interest in this study looking at the emotional impact of traumatic injuries to the hand, wrist and elbow. You have been invited to participate in this study because you have sustained an injury to your hand, wrist or elbow in the past three months.

Included with this packet you should find a copy of the Information Sheet (which will provide more information about the study and specifically what you will be asked to do should you decide to enrol in the study), a consent form, a questionnaire packet, and an envelope. Please take a few minutes to carefully read the Information Sheet before deciding whether or not to participate. If you do decide you would like to participate, please read and sign the consent form. The questionnaire includes multiple choice questions asking about your stress levels since your injury, how well you are able to use your hand or arm, and what aspects of having a hand injury (if any) have been stressful for you. It should take you about 15-20 minutes to complete. When you are finished, place the questionnaire form in the envelope provided, seal the envelope, and return the envelope and the
signed consent form to the Physiotherapy Outpatients reception desk. You may also take the packet home and mail it back to us in the mailing envelope provided.

Please note that you do not have to take part in this study. If you decide not to participate, there will be no disadvantages to you of any kind. Your therapy will be the same as it would be if you had decided to participate.

If you have any questions about the study, please feel free to contact me at 03 474 7945 or at mayel636@student.otago.ac.nz. Thanks again for your consideration.

Regards,

Elizabeth Mayland
Principal Investigator
Appendix A8: Participant questionnaire Study I

A study of the emotional impact of upper limb injuries

Questionnaire for Beth Mayland

Department of Psychology

Department of Women’s and Children’s Health

This booklet contains some questions about your stress levels since your injury, how well you are able to use your hand or arm, and what aspects of having a hand injury (if any) have been stressful for you. Although we have tried to avoid overlap, you may notice that some of the questions sound similar. This is because some of the questions are taken out of standardized assessments which are looking at slightly different things. It is not a trick! Please try to answer every question – there are no right or wrong answers. Keep in mind that your answers are confidential. When you have finished, place the questionnaire in the envelope provided and return the envelope and your consent form to the Outpatient Physiotherapy reception desk. It should take you about 15-20 minutes to complete the questionnaire.
To begin, please answer a few questions about yourself.

1. How old are you? ___________ years

2. How would you describe your cultural origins? (Please tick the box or boxes that apply to you.)
   - □ New Zealand European
   - □ Māori
   - □ iwi and/or hapu: _______________________________________
   - □ Cook Islands Māori
   - □ Niuean
   - □ Samoan
   - □ Tongan
   - □ Chinese
   - □ Indian
   - □ Other origin or origins (please give any details you would like to share):
     _______________________________________________________

3. Sex
   - □ Female
   - □ Male

4. On what date did your injury occur?
   ________/_______/_______
   Day     Month     Year

5. Which hand/wrist/arm have you injured?
   - □ Right
   - □ Left
   - □ Both

6. Which hand do you normally write with? (Please tick ONE box.)
   - □ Right
   - □ Left
7. How would you describe your injury? (Please tick the **box or boxes** which most closely matches your injury.)

- □ Fracture (break) of elbow, forearm, wrist or hand (not including fingers)
- □ Fracture (break) of fingers/thumb
- □ Sprain or strain of wrist/TFCC tear/other ligament tear in wrist
- □ Sprain of finger or thumb/ligament injury to thumb
- □ Laceration (cut) to tendon or nerve
- □ Laceration to muscle which did not involve a tendon or nerve which required repair
- □ Burns to hand or forearm
- □ Crush injury with multiple trauma (open wounds, fractures, tendon or nerve injuries, etc)
- □ Other (please describe): ____________________________________________

8. Has your treatment included any of the following? (Please tick the box or boxes that apply to you.)

- □ Cast and/or splint
- □ Surgical repair (including pins, plates, sutures, staples, etc.)
- □ Overnight stay in hospital
  - o □ If so, please indicate number of nights: ______________
- □ Stitches or staples on skin only
- □ None of the above

9. How did your injury occur? (Please tick the **ONE box** closest to what happened.)

- □ Fall from a height (i.e. fall from scaffolding or higher than 1 meter)
- □ Fall from standing height (i.e. tripped over something or slipped on ice)
- □ Using heavy machinery (i.e. chainsaw/skillsaw/circular saw, machinery at work, tractor, etc.)
- □ Car or motorbike accident
- □ Sports or leisure injury (ie riding horse, bicycling, rugby etc.)
- □ Cut on sharp object (glass, cooking knives, box cutter, scalpel etc.)
- □ Burn (fire, electrical or chemical)
☐ Crush injury (ie slammed in a door, crushed between two objects)
☐ Other (please describe):
___________________________________________________
10. Where were you when your injury occurred? (Please tick ONE box.)

☐ At work
☐ At home
☐ On a road
☐ Other: ____________________________________________

11. What is your current job status? (Please tick the box or boxes that apply to you.)

☐ Employed full-time
☐ Employed part-time
☐ Self-employed (either full-time or part-time)
☐ Homemaker
☐ Unemployed
☐ Unable to work due to illness
☐ Retired
☐ Student
This questionnaire asks about your symptoms as well as your ability to perform certain activities. Please answer every question, based on your condition in the past week, by circling the appropriate number. If you did not have an opportunity to perform the activity in the past week, please make your best estimate of which response would be the most accurate. It doesn't matter which hand or arm you use to perform the activity; please answer based on your ability regardless of how you perform the task.

Please rate your ability to do the following activities in the last week by circling the number below the appropriate response.

<table>
<thead>
<tr>
<th></th>
<th><strong>Open a tight or new jar.</strong></th>
<th><strong>Do heavy household chores (e.g. wash walls, floors).</strong></th>
<th><strong>Carry a shopping bag or briefcase.</strong></th>
<th><strong>Wash your back.</strong></th>
<th><strong>Use a knife to cut food.</strong></th>
<th><strong>Recreational activities in which you take some force or impact through your arm, shoulder or hand (e.g. golf, hammering, tennis, etc.).</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>No difficulty</strong></td>
<td><strong>Mild difficulty</strong></td>
<td><strong>Moderate difficulty</strong></td>
<td><strong>Severe difficulty</strong></td>
<td><strong>Unable</strong></td>
<td><strong>No difficulty</strong></td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>1</td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th><strong>During the past week, to what extent has your arm, shoulder, or hand problem interfered with your normal social activities with family, friends, neighbors or groups?</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Not at all</strong></td>
</tr>
<tr>
<td>7</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th><strong>During the past week, were you limited in your work or other regular daily activities as a result of your arm, shoulder, or hand problem?</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Not limited at all</strong></td>
</tr>
<tr>
<td>8</td>
<td>1</td>
</tr>
</tbody>
</table>

Please rate the severity of the following symptoms in the past week. (circle number)

<table>
<thead>
<tr>
<th></th>
<th><strong>Arm, shoulder or hand pain.</strong></th>
<th><strong>Tingling (pins and needles) in your arm, shoulder or hand.</strong></th>
<th><strong>During the past week, how much difficulty have you had sleeping because of the pain in your arm, shoulder or hand? (circle number)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>None</strong></td>
<td><strong>Mild</strong></td>
<td><strong>Moderate</strong></td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>2</td>
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</tbody>
</table>
We are interested in your personal views of your injury and how it has affected you. Please indicate how much you agree or disagree with the following statements about your injury by ticking the appropriate box.

<table>
<thead>
<tr>
<th>Views about your injury</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither agree nor disagree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP6 My injury is a serious condition.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IP7 My injury has major consequences on my life.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>IP8 My injury does not have much effect on my life.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>IP9 My injury strongly affects the way others see me.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>IP10 My injury has serious financial consequences.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>IP11 My injury causes difficulties for those who are close to me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IP12 There is a lot which I can do to control my symptoms.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IP13 What I do can determine whether my injury gets better or worse.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>IP14 The course of my injury depends on me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IP15 Nothing I do will affect my injury.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IP16 I have the power to influence my injury.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IP17 My actions will have no effect on the outcome of my injury.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IP19 There is very little that can be done to improve my injury.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IP20 My treatment will be effective in curing my injury.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>IP21 The negative effects of my injury can be prevented (avoided) by my treatment.</td>
<td></td>
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</tr>
<tr>
<td>IP22 My treatment can control my injury.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>IP23 There is nothing which can be done to help my condition.</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>IP24 I have a clear picture or understanding of my condition.</td>
<td></td>
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<tr>
<td>IP25 I get depressed when I think about my injury.</td>
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<tr>
<td>IP26 When I think about my injury I get upset.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>IP27 My injury makes me feel angry.</td>
<td></td>
<td></td>
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<tr>
<td>IP28 My injury does not worry me.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>IP29 Having this injury makes me feel anxious.</td>
<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>IP30 My injury makes me feel afraid.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

266
Pain is a nearly unavoidable consequence of any hand or arm injury. Below are some ways in which people may respond to that pain. Please rate how often you experience each situation described below by ticking one box between “0” = Never and “5” = always.

<table>
<thead>
<tr>
<th>Question</th>
<th>0 Never</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1 I can’t think straight when in pain.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P2 During painful episodes, it is difficult for me to think of anything besides the pain.</td>
<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>P3 When I hurt, I think about pain constantly.</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>P4 I find it hard to concentrate when I hurt.</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P5 I worry when I am in pain.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P6 I go immediately to bed when I feel severe pain.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>P7 I will stop any activity as soon as I sense pain coming on.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P8 As soon as pain comes on I take medication to reduce it.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P9 I avoid important activities when I hurt.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P10 I try to avoid activities that cause pain.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P11 I think that if my pain gets too severe it will never decrease.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P12 When I feel pain, I am afraid that something terrible will happen.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P13 When I feel pain, I think I may be seriously ill.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P14 Pain sensations are terrifying.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P15 When pain comes on strong, I think that I might become paralyzed or more disabled.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>P16 I begin trembling when engaged in an activity that causes pain.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P17 Pain seems to cause my heart to pound or race.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P18 When I sense pain, I feel dizzy or faint.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P19 Pain makes me nauseous.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P20 I find it difficult to calm my body down after periods of pain.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Sometimes an injury which disrupts your life can have an impact on your mood or how you see yourself. A number of statements which people have used to describe themselves are given below. Please read each statement and then circle the number that indicates how you *generally feel* (almost never, sometimes, often, almost always). There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you *generally feel*.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Almost never</th>
<th>Sometimes</th>
<th>Often</th>
<th>Almost always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I feel pleasant.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>I feel nervous and restless.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>I feel satisfied with myself.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>I wish I could be as happy as others seem to be.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>I feel like a failure.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>I feel rested.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>I am &quot;calm, cool, and collected&quot;.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>I feel that difficulties are piling up so that I cannot overcome them.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>I worry too much over something that really doesn’t matter.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>I am happy.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>11</td>
<td>I have disturbing thoughts.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>12</td>
<td>I lack self-confidence.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>13</td>
<td>I feel secure.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>14</td>
<td>I make decisions easily.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>15</td>
<td>I feel inadequate.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>16</td>
<td>I am content.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>17</td>
<td>Some unimportant thought runs through my mind and bothers me.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>18</td>
<td>I take disappointments so keenly that I can’t put them out of my mind.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>19</td>
<td>I am a steady person.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>20</td>
<td>I get tension or turmoil as I think over my recent concerns and interests.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
A number of statements which people have used to describe themselves are given below. Please read each statement and then circle the number that indicates how you feel *since your injury*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describes your feelings *since your injury* best.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Almost Never</th>
<th>Sometimes</th>
<th>Often</th>
<th>Almost Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>21 I feel calm.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>22 I feel secure.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>23 I feel tense.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>24 I feel strained.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>25 I feel at ease.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>26 I feel upset.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>27 I am presently worrying over possible misfortunes.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>28 I feel satisfied.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>29 I feel frightened.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>30 I feel comfortable.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>31 I feel self-confident.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>32 I feel nervous.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>33 I feel jittery.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>34 I feel indecisive.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>35 I am relaxed.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>36 I feel content.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>37 I am worried.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>38 I feel confused.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>39 I feel steady.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>40 I feel pleasant.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
Finally, please take a moment to think about the ways in which this injury has impacted your life and your ability to get through your day. Listed below are a number of areas in which some people who have had an injury to an upper limb have reported as a cause of worry or bother. Please rate how much worry/bother each of following issues has caused you since your injury by circling the appropriate number using the following scale:

- **N/A** = Not applicable to my situation
- 1 = None
- 2 = A little bit
- 3 = A moderate amount
- 4 = Quite a bit
- 5 = Extreme worry or bother

<table>
<thead>
<tr>
<th>Potential issue</th>
<th>How much worry/bother has this caused you?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Problems with daily tasks like getting dressed, preparing food, or household chores</td>
<td>1 2 3 4 5 N/A</td>
</tr>
<tr>
<td>2 Having pain</td>
<td>1 2 3 4 5 N/A</td>
</tr>
<tr>
<td>3 Appearance of my hand/arm/ﬁnger</td>
<td>1 2 3 4 5 N/A</td>
</tr>
<tr>
<td>4 Having to depend on others to help me complete daily tasks</td>
<td>1 2 3 4 5 N/A</td>
</tr>
<tr>
<td>5 Decreased intimacy with my partner due to my injury</td>
<td>1 2 3 4 5 N/A</td>
</tr>
<tr>
<td>6 Inability to play my sport/instrument or other leisure activity</td>
<td>1 2 3 4 5 N/A</td>
</tr>
<tr>
<td>7 Job-related issues (i.e. loss of income, fear of losing my job, getting time off work for therapy)</td>
<td>1 2 3 4 5 N/A</td>
</tr>
<tr>
<td>8 Boredom – involuntary inactivity</td>
<td>1 2 3 4 5 N/A</td>
</tr>
<tr>
<td>9 Uncertainty about future function of my hand/arm</td>
<td>1 2 3 4 5 N/A</td>
</tr>
<tr>
<td>10 Having nightmares or flashbacks to when the injury occurred</td>
<td>1 2 3 4 5 N/A</td>
</tr>
<tr>
<td>11 Attending medical appointments with therapists, doctors, nurses, etc</td>
<td>1 2 3 4 5 N/A</td>
</tr>
<tr>
<td>12 Other: (Please describe below)</td>
<td>1 2 3 4 5 N/A</td>
</tr>
</tbody>
</table>

Other issue (option #12)
___________________________________________________________________________________________

Thank-you very much for taking the time to participate in this research study!

Please check back through to make sure that you have answered every question. When you are done, place this booklet into the envelope provided and return the envelope and your **signed** consent form to the Outpatient Physiotherapy reception desk.
Appendix B

Results of the IPQ-R Data in Study I

B.1 Illness perceptions in Study I

In Study I, five subscales from the revised Illness Perceptions Questionnaire (IPQ-R) (Moss-Morris, 2002) were included to determine participants’ beliefs about their injuries: the full Consequences, Personal Control, Treatment Control, and Emotional Representations subscales and one question from the Illness Coherence (IP28: I have a clear picture or understanding of my condition). The remaining items in the Illness Coherence subscale were not included in order to reduce the response burden on participants (See Chapter 2 for a review of the IPQ-R). Within these scales, respondents are asked to rate their agreement with each statement on a 5-point scale from 1 = “Strongly disagree” to 3 = “Neither agree nor disagree” to 5 = “Strongly agree.” Scores are calculated individually for each subscale by summing the items in that category (note that scores from thirteen items are reversed when calculating final score). Subscale scores range from 4 to 30 depending on the number of questions in each subscale (Moss-Morris, et al., 2002). The Timeline and Illness Coherence subscales were excluded from this study to decrease response burden and because they were not central to the hypotheses.

The IPQ-R has demonstrated consistently stable factor structures and strong psychometric properties in a variety of related populations (self-reported hand problems, acute hand injuries, trauma and acute pain) (Chan, et al., 2009; Hill, Dziedzic, Thomas, Baker, & Croft, 2007; Lee, Chaboyer, & Wallis, 2008, 2010; Moss-Morris, et al., 2002). As the authors encourage researchers to adapt the IPQ-R to the study population, psychometric properties of the IPQ-R are reported here for studies with the most relevant populations. Construct validity of the IPQ-R in related populations is sound with relationships established between the subscales and various conceptually related measures of general
health (self-reported general practitioner consultation; (Hill, et al., 2007), mental health (Hospital Anxiety and Depression Scale, Positive and Negative Affect Schedule, SF-36 Mental Summary Score)(Hill, et al., 2007; Lee, et al., 2008; Moss-Morris, et al., 2002), and physical disability (SF-36 Physical Summary Score)(Lee, et al., 2008). Internal consistency of the subscales in related populations ranges from .75 to .90 (Chan, et al., 2009; Hill, et al., 2007; Moss-Morris, et al., 2002) with expected variability in test-retest reliability due to the changing nature of illness perceptions (.35 to .88)(Moss-Morris, et al., 2002). Cronbach's alphas in this study ranged from .78 and .87.

B.2 Results

B.2.1 Illness beliefs

Mean scores on IPQ-R subscales are presented in Table B.1. Scores were calculated both as a total subscale score and as a mean of responses within a subscale in order to adequately compare results with previously published studies.

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Mean total score (± SD)</th>
<th>Range</th>
<th>Possible Range</th>
<th>Mean response score (± SD)</th>
<th>Item Range</th>
<th>Item Possible Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consequences</td>
<td>18.09 (5.30)</td>
<td>7-30</td>
<td>6-30</td>
<td>3.04 (.89)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal Control</td>
<td>22.71 (3.50)</td>
<td>13-30</td>
<td>6-30</td>
<td>3.82 (.59)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment Control</td>
<td>19.13 (3.26)</td>
<td>11-25</td>
<td>11-25</td>
<td>3.86 (.69)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional Representations</td>
<td>16.72 (5.18)</td>
<td>6-30</td>
<td>6-30</td>
<td>2.81 (.89)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Understanding of injury¹</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>4.07 (.64)</td>
<td>2-5</td>
<td>1-5</td>
</tr>
</tbody>
</table>

¹ = Note that only 1 item from the Illness Coherence subscale (Question 28) was included in this study so that it was not possible to calculate at subscale total.

Males reported significantly higher treatment control (t = 2.376, df = 81, p = .020)(mean males: 19.89, female: 18.23) and personal control (t = 2.301, df = 82, p = .024)(mean males: 23.51, female: 21.79) over their injuries than females. No
differences were found between injury perceptions of males and females on remaining subscales. Most participants reported a good understanding of their injury with mean score on Illness Coherence subscale 4.07 (± .64).

**B.2.2 Associations between illness beliefs, measures of anxiety, and disability**

Correlations between the IPQ-R subscales and disability are presented in Table B.2. Personal control was negatively correlated with disability, indicating that those who felt a greater sense of control over their recovery or injury felt less disabled than those who did not share this feeling. There was a moderate correlation between the belief in serious consequences and negative emotional reactions to injury. Those who felt confident in their ability to control the outcome of their injury were also significantly more likely to have confidence in the effectiveness of the treatment they were receiving for their injury. Results also indicate that those with more confidence in either their own ability or the ability of their treatment to manage their injury had a better understanding of their injury.

**Table B.2: Correlations between disability and illness perceptions**

<table>
<thead>
<tr>
<th></th>
<th>Disability¹</th>
<th>Conseq</th>
<th>Personal Control</th>
<th>Treatment Control</th>
<th>Emotional Rep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consequences</td>
<td>.428**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal control</td>
<td>-.236*</td>
<td>-.118</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment control</td>
<td>-.196</td>
<td>-.003</td>
<td>.508**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional Representations</td>
<td>.292**</td>
<td>.492**</td>
<td>-.176</td>
<td>-.313**</td>
<td></td>
</tr>
<tr>
<td>Understanding of injury²</td>
<td>-.121</td>
<td>-.014</td>
<td>.300**</td>
<td>.251*</td>
<td>-.088</td>
</tr>
</tbody>
</table>

¹: Disability represented by QuickDASH total score; ** = Correlation is significant at the 0.01 level (2-tailed); * = Correlation is significant at the .05 level (2-tailed); ²: Note that the Illness Coherence subscale was measured using only 1 item (Question 28) for this study.
Correlations between the IPQ-R subscales and measures of anxiety are presented in Table B.3. As expected, participants’ emotional reactions to their injury demonstrated moderate to strong correlations with all four types of anxiety. Belief in the seriousness of the overall consequences of the injury demonstrated a moderate to strong correlation with post-injury anxiety, pain anxiety and state anxiety and a weaker but significant correlation with trait anxiety. Confidence in the effectiveness of treatment was negatively correlated with both state anxiety and post-injury anxiety but was not related to fear of pain or a general tendency towards anxiety.

Table B.3: Correlations between illness perceptions and anxiety

<table>
<thead>
<tr>
<th></th>
<th>S-Anxiety</th>
<th>T-Anxiety</th>
<th>Pain Anxiety</th>
<th>RRAQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consequences</td>
<td>.331**</td>
<td>.238*</td>
<td>.411**</td>
<td>.544**</td>
</tr>
<tr>
<td>Treatment control</td>
<td>-.357**</td>
<td>-.191</td>
<td>-.169</td>
<td>-.170</td>
</tr>
<tr>
<td>Emotional representations</td>
<td>.565**</td>
<td>.481**</td>
<td>.481**</td>
<td>.559**</td>
</tr>
<tr>
<td>Personal control</td>
<td>-.164</td>
<td>-.082</td>
<td>-.221*</td>
<td>-.305**</td>
</tr>
</tbody>
</table>

** = Correlation is significant at the 0.01 level (2-tailed);
* = Correlation is significant at the .05 level (2-tailed)

B.3 Discussion

Overall, the IPQ-R data from Study I suggest that participants experienced moderate worry and depressive symptoms (based on responses on the Emotional Reactions and Consequences subscales) relative to their injury but that these reactions varied considerably by individual. However, the moderate negative correlation between Treatment Control and Emotional Representations suggests that a stronger belief in the efficacy of treatment (Treatment Control) helped to alleviate some of the emotional reactions to injury in this cohort. This association was not found in a cohort of individuals with traumatic hand injuries immediately following injury (Chan, et al., 2009). In contrast to previous findings in individuals with traumatic hand injuries, beliefs about the negative consequences of injury on social and financial functioning were moderately
correlated with self-reported disability (Chan, et al., 2009). Beliefs about negative consequences and emotional responses to injury (Emotional Representations) also exhibited moderate to strong correlations with recovery-related forms of anxiety (and, to a lesser degree, to trait anxiety). These findings suggest that aspects of patients’ perceptions of their injuries and recovery may be related to the anxiety they are experiencing.

In general, participants in Study I of this thesis reported greater emotional impact of their injury than studies evaluating similar populations, including self-reported hand problems (Hill, 2007) and traumatic hand injuries (Chan, et al., 2009). It is possible that these variations are due to the differences between the timing of the research relative to injury or to the type of upper limb injury sustained by participants in these studies when compared to Study I. For instance, participants in Chan, et al. (2009) completed the IPQ-R while still in the hospital immediately following a traumatic hand injury. It is possible that these participants had not yet had time to process the implications of their injury to various aspects of their lives. This suggestion is corroborated by a study of those with general traumatic injuries, which showed that the both Emotional Representations and Consequences scores were increased at six months after injury when compared to discharge from hospital (Lee, et al., 2010). The participants in Hill et al. (2007) differed from the sample Study I in that they had not necessarily sustained traumatic hand injuries, but instead reported “hand problems” in a self-report measure including the Arthritis Impact Measurement Scales (AIMS2) (Meenan & Mason, 1990) and questions on self-reported diagnoses and General Practitioner consultation (Hill, et al., 2007). In this case, the resulting sample may be representative of those with milder forms of hand injuries than those who participated in Study I, who all sustained mild to moderate traumatic upper limb injuries requiring outpatient hand therapy. These results suggest that emotional reactions to injury such as worry about the consequences of injury or anxiety may vary depending on the nature of the injury and the timing in the recovery process. In particular, it suggests that worry or anxiety relating to the impact of the injury on various aspects of life
may actually increase over time. It is important for clinicians to be aware of this trend in order to address the impact of injuries on such things as financial security in the later stages of rehabilitation.

Although these findings represent some interesting and useful information for both researchers and clinicians, I decided not to include this data within my overall research results for two reasons. Firstly, I did not feel that these data provided enough additional information about anxiety in this population to be useful to the results of Study I (See Chapter 5). The two subscales most strongly correlated with anxiety in this study were the Consequences and the Emotional Representations subscales. The items within the Emotional Representations subscale focus specifically on emotional reactions to injury such as anxiety or depression. However, I did not feel that they provided any additional information about general symptoms of anxiety that was not covered by the other anxiety scales used within Study I.

Secondly, while the IPQ-R attempts to link emotional and cognitive reactions to injury with the specific context of the injury or illness, I felt that the context provided by this tool was too vague for the population of Study I. For instance, the items within the Emotional Representations subscale link vague emotional symptoms of anxiety to injury simply by including the phrase “My injury.” This does not provide any information about the specific aspects of recovery that create this distress. Within the Consequences subscale, participants are asked to agree or disagree with statements such as “My injury has major consequences on my life” and “My injury has serious financial consequences.” Again, the respondent is asked to refer simply to the global experience of “my injury” without reference to what particular aspects of the experience may have precipitated the consequence. While a major illness or injury (e.g. cancer or spinal cord injury) may result in strong emotional reactions to the illness/injury in general, it is possible that those who have sustained mild to moderate upper limb injuries may not associate their anxiety with the context of their injury in the same way. As mild to moderate upper limb injuries are not typically
associated with strong emotional reactions like anxiety, providing a more
directed link between the anxiety and the aspects of recovery that could be
distressing may encourage respondents to pause and consider their emotional
state in relation to their injury. Further research exploring this connection would
be useful.
Appendix C

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RESEARCH PAPER

Recovery-related anxiety and disability following upper limb injury: the importance of context

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Abstract

Purpose Anxiety following traumatic upper limb injury is common and may affect rehabilitation outcomes. Most previous research has focused on psychiatric anxiety disorders among those with severe injuries. The aims of this study were to determine the prevalence of anxiety among patients with mild to moderate traumatic upper limb injuries, to investigate the correlation between anxiety and disability, and to provide preliminary validation of the Recovery-Related Anxiety Questionnaire (RRAQ). Method Eighty-four adults with a recent traumatic upper limb injury completed the State & Trait Anxiety Inventory (STAI), the Pair Anxiety Symptoms Scale (PASS;21), the RRAQ and the shortened Disability of the Arm, Shoulder and Hand Questionnaire (QuickDASH). Prevalence rates of anxiety were calculated, and linear regression analysis was used to identify predictors of QuickDASH scores. Results All participants reported some anxiety, with higher levels of recovery-related anxiety than general anxiety. In linear regression analysis, the four types of anxiety accounted for 20% of the variance in QuickDASH scores. The RRAQ accounted for 10% of the variance in QuickDASH scores. Conclusions: Recovery-related forms of anxiety appear to be more common and more strongly associated with disability than general anxiety symptoms for patients with mild to moderate traumatic upper limb injuries.

KEYWORDS

Anxiety, traumatic injury Implications for rehabilitation upper limb

History

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Implications for Rehabilitation

• Following mild to moderate traumatic upper limb injury, anxiety about the injury and recovery is common.
• Recovery-related anxiety is more strongly associated with disability than general anxiety symptoms.
• Phrasing questions about anxiety directly associated with the recovery experience may give greater insight into the anxiety patients with mild to moderate upper limb injuries are experiencing.
• This insight may help clinicians to directly address recovery-related issues, potentially decreasing disability experienced by patients.

Introduction

Our hands function as emotional and communicative extensors of ourselves. Given this, it is unsurprising that traumatic upper limb injuries are frequently associated with psychological distress [1,2]. One common manifestation of psychological distress following traumatic injuries is anxiety, which is typically manifested by excess worry [1,2]. Higher levels of anxiety have been linked to intensified pain experiences [3] and increased disability [4,5] following severe traumatic upper limb injuries. However, these findings may not apply to a typical hand therapy patient, many of whom have mild to moderate traumatic injuries and whose anxiety may be very context specific, because: (1) the portrayal of anxiety in this research area relies heavily on symptoms of psychiatric anxiety disorders; (2) there has been a focus on individuals with severe traumatic injuries and (3) there is limited published data on the prevalence of anxiety following upper limb injuries.

There is some debate surrounding the nature of anxiety. Many psychologists argue that anxiety should be viewed along a continuum without an artificial cutoff determining “pathological” versus “non-pathological” anxiety. However, one of the most commonly cited tools used to describe anxiety, the Diagnostic and Statistical Manual (DSM) of the American Psychiatric Association [6], identifies a set of named anxiety-related disorders such as Generalized Anxiety Disorder (GAD) and Post-Traumatic Stress Disorder (PTSD), and describes symptoms and “pathological” diagnostic criteria for each of these disorders. Within the DSM, the psychological symptoms of these disorders are described in terms of extremities (“clinically significant distress”), “severe and persistent” symptoms and
"excessive anxiety and worry") [4]. These psychological symptoms are often linked to somatic criteria (such as muscle tension, trembling or twitching) or described as "out of proportion to the actual...event" [6]. The DSM disorders typically consider symptoms out of context to a specific event with the exception of the phobias, PTSD and Acute Stress Disorder (ASD). For the purposes of this study, "anxiety disorder(s)" will be used to describe anxiety forms similar to those described in the DSM that are focused on more extreme manifestations of somatic or cognitive symptoms.

In contrast, anxiety at the lower end of the continuum may be proportional to the exciting event, occur only in association to activities or thoughts directly impacted by the event, and cause few somatic symptoms. In this study, "recovery-related anxiety" will be used to describe forms of anxiety on the lower end of this continuum related to traumatic injury and not otherwise described in the DSM. Recovery-related anxiety constructs have been explored in individuals with traumatic upper limb injury and range from fear of re-injury [11] to deficiency anxiety [7] to anxiety related specifically to the experience of pain [3,4,8]. The milder presentation of recovery-related anxiety may lead healthcare providers and others to view it as an understandable or "normal" reaction to traumatic injury. However, some forms of recovery-related anxiety, such as pain anxiety, have been associated with increased pain [3] and disability [4] in those with upper limb injuries, indicating that recovery-related anxiety may result in worse outcomes for those with upper limb injuries even in the absence of a pre-injury or post-injury anxiety disorder. Unfortunately, recovery-related anxiety may be difficult to measure as different aspects of recovery may be anxiety-inducing for different people. As a result, the measures commonly used to identify anxiety following traumatic upper limb injuries are often based on the symptoms of the DSM-based anxiety disorders [5,6]. For instance, the Hospital Anxiety and Depression Scale (HADS) is a psychological measure designed to be administered to those experiencing a physical illness or injury [9,10]. Anxiety-related statements on the HADS mirror the symptoms of GAD described in the DSM including: “Worrying thoughts go through my mind” and “I feel restless as if I have to be on the move” [9]. Respondents are not asked to relate these symptoms specifically to their injury or recovery experience instead focusing on how they have generally felt over the past fortnight. As recently pointed out by Vranceanu et al., the stigma associated with words and phrases used within the medical community may have a strong influence on the responses provided by patients [11].

In this case, it is possible that respondents may be reluctant to endorse a symptom that appears to reflect their general mental state when they perceive any anxiety they may feel to be related only to the experience of recovering from their injury. The reliance on measures assessing symptoms of anxiety disorders out of context to the injury and recovery limits comprehension of other, milder forms of recovery-related anxiety that may be experienced by patients with minor to moderate traumatic upper limb injury.

Because many of the studies examining anxiety following traumatic limb injuries focus on the types of extreme symptoms described in diagnoses like PTSD, these studies also tend to focus on those with severe injuries. For example, the extreme symptoms of anxiety disorders such as the nightmares and flashbacks found in PTSD are common following amputations or severe, mutilating injuries of the hand [7,12,13] and may be found after upper limb fractures [14]. However, the less traumatic nature of more minor traumatic injuries like finger and wrist sprains makes it likely that symptoms of PTSD are less common. Unfortunately, while a few studies have reported prevalence of symptoms of anxiety disorders following minor to moderate traumatic upper limb injuries, these studies tend to report only mean and standard deviation of scores on anxiety measures [15,16] or numbers of patients who were “positive” for PTSD [17]. There is also little evidence of the distribution of recovery-related anxiety following minor to moderate upper limb injuries; while studies indicate that recovery-related anxiety is associated with disability following more minor injuries, they do not cite the prevalence of this form of anxiety in the study sample [8,18]. These reporting styles make it difficult to determine the distribution of either type of anxiety and hence the scope of the problem within the population.

Given the current lack of information regarding the incidence and nature of anxieties experienced after mild-moderate traumatic upper limb injuries, the primary aims of this study were (1) to measure the prevalence of three types of recovery-related anxiety and one form of general anxiety in a typical high-threshold clinic population and (2) to examine the cross-sectional relationship between perceived disability and types of anxiety. The four types of anxiety are: (1) state anxiety (anxiety experienced since injury); (2) pain anxiety; (3) anxiety or worry directly related to aspects of recovery from a traumatic upper limb injury and (4) generalized anxiety (non-contextual). A secondary aim of this study was to report the results of initial testing using a novel measure called the Recovery-Related Anxiety Questionnaire (RRAQ).

Materials and methods

The Lower South Regional Ethics Committee and the combined Southern District Health Board and Dunedin School of Medicine Research Advisory Group approved this cross-sectional study.

Subjects

Adults receiving treatment for a traumatic injury to the elbow, wrist or hand were invited to participate if their injury was sustained <3 months prior. The timeframe of 3 months was selected to evaluate anxiety during the period of time when most patients are enrolled in outpatient therapy. Individuals with a wide variety of traumatic diagnoses were sought in order to simulate the patient population of a general outpatient hand therapy clinic. However, those with non-traumatic upper limb problems were excluded as it was felt that a different set of recovery-related concerns may apply to them. Additional exclusion criteria were: (1) presence of a diagnosed psychiatric anxiety disorder and (2) inability to complete the written questionnaire in English. Participants were recruited from the Outpatient Physiotherapy Department at Dunedin Hospital between June 2010 and January 2011. A total of 164 questionnaires were handed out by clinical staff and 84 completed questionnaires were returned (response rate=51%). Data were not collected on reasons for non-participation.

Testing protocol

Following written consent, participants completed the questionnaire in their own time and returned them by post. The questionnaire consisted of questions about demographics, the injury, self-reported disability and the three following self-report measures. The anxiety measures were presented in a fixed order following the QuickDASH based upon the degree to which each measure related anxiety to the context of recovering from a traumatic upper limb injury as follows.

Disabilities of the Arm, Shoulder and Hand

Perceived disability was evaluated using the Disabilities of the Arm, Shoulder and Hand (QuickDASH) [18], a well-established measure of disability following upper limb injury with strong

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psychometric properties [19]. Total scores range from 0 to 100, with higher numbers indicating greater disability. Total scores were not calculated for participants with more than two missing items as recommended by the original authors [18,19].

**Pain Anxiety Symptoms Scale**

Anxiety specifically about pain was assessed with the shortened form of the Pain Anxiety Symptoms Scale (PASS-20) [20]. The PASS-20 measures the multiple facets of pain anxiety and contains four subscales: (1) cognitive anxiety, (2) escape–avoidance behaviors, (3) fear of pain and (4) physiological symptoms of anxiety [21]. Total scores range from 0 to 100 and are computed by summing ratings across the entire measure. The PASS-20 has been used to evaluate pain anxiety in contexts including individuals with hand fractures [3], community physiotherapy patients [22] and in a community sample of undergraduate students [23]. The PASS-20 demonstrates consistently good reliability and validity within these populations [20,24].

**State and Trait Anxiety Inventory**

Generalized dispositional anxiety symptoms (trait anxiety or T-Anxiety) and generalized situational anxiety symptoms (state anxiety or S-Anxiety) were screened using the State and Trait Anxiety Inventory (STAI) [25]. State anxiety (S-Anxiety) was defined as anxiety since injury in this study. The STAI has strong psychometric properties when used in a variety of populations such as post-surgical candidates, individuals with generalized anxiety disorder and the general population [25-29].

**Recovery-Related Anxiety Questionnaire**

The Recovery-Related Anxiety Questionnaire (RRAQ) is a novel questionnaire designed specifically for this study to investigate recovery-related anxiety following traumatic upper limb injuries. The RRAQ consists of 11 questions covering a range of potentially anxiety-inducing aspects of recovery from a traumatic hand injury. The majority of the questions are based on the results of a qualitative study by Gustafsson and colleagues who identified stressors following traumatic hand injuries [30]. Questions were added to screen for anxiety relating to nightmares/flashesbacks [7], and sexual dysfunction [31], both of which have been shown to be present in some individuals following traumatic hand injuries. A final question was added to screen for anxiety relating to ‘Attending medical appointments with therapists, doctors and nurses’. Respondents are asked to rate ‘How much worry/bother’ each statement has caused them since their injury (<3 months) on a 5-point scale point with 1 = “None”, 2 = “A little bit”, 3 = “A moderate amount”, 4 = “Quite a bit”, and 5 = “Extremely worry or bother”. Total score was calculated by summing these scores. The terms ‘worry’ and ‘bother’ were selected in an attempt to emphasize the association between the emotional state and the injury without the negative connotations that may be associated with the words ‘anxiety’ or ‘stress’. Participants are also asked to indicate that the statement does not apply to their situation (“N/A” = 6). For purposes of analysis, an answer of “N/A” or a missing item was scored as “None”, thus, higher scores represent a greater total amount of worry/bother across the scope of items. The total score was not calculated if three or more items had been missed or answered as NA (N = 4).

**Statistical methods**

Z-scores were calculated to screen for outliers; no scores were outside 2 standard deviations from the mean. Descriptive statistics including mean scores and standard deviations were calculated to determine distribution of responses. Associations between disability (QuickDASH) and anxiety levels or worry were calculated using Pearson’s correlation coefficients. Pearson’s correlation coefficients were also calculated between total scores of the anxiety measures (STAI, PASS-20 and RRAQ) to establish internal content validity of the RRAQ.

A hierarchical linear multiple regression analysis was performed to determine how much variance in self-reported disability (QuickDASH) could be accounted for by trait anxiety, state anxiety, pain anxiety and anxiety relating to the injury. Variables were entered in Step 1 based upon prior studies indicating a significant relationship with self-reported disability (T-Anxiety, S-Anxiety, pain anxiety) [3,25] or predicted contribution to disability (RRAQ). Several assumptions regarding the data were evaluated prior to interpretation of the results of the multiple regression analysis. Scatterplots of scores from each tool indicate a normal distribution of scores. The maximum Mikhailanov distance of 11.571 did not exceed the critical $X^2$ value of 18.47 for $df = 4$ (with $\alpha = 0.05$), indicating that there were no multivariate outliers. The moderate to high tolerances for all of the predictors (range 0.388–0.710) in the regression model indicates acceptable levels of multicollinearity.

**Results**

Participant demographics are presented in Table 1 while the descriptive statistics of the anxiety measures and normative population means are presented in Table 2.

**Prevalence of anxiety**

Scores on all anxiety measures were normally distributed. Fifty-nine percent of participants reported greater than average pain anxiety (30% = 1SD > norm; 29% = 2-3SD > norm). Abrams calculated a cut-off of >30 to indicate high pain anxiety, 45% of this sample was above this cut-off [35]. Fifty-seven percent of participants in the current study reported higher than average

| Table 1. Demographics of study population. |
|-----------------------------------------|---|
| Sex                                      | N (%) |
| Male                                     | 45 (53.5%) |
| Female                                   | 40 (46.5%) |
| Ethnicity                                | N/A  |
| N/A European                            | 72 (85.7%) |
| Maori                                    | 4 (4.8%) |
| other                                    | 8 (9.5%) |
| Dominant side injured                    | N/A  |
| Injury type                              | N/A  |
| Fracture elbow/wrist/hand                | 25 (29.4%) |
| Fracture finger/hand                     | 24 (28.5%) |
| Lacertan tendon/nerve                    | 18 (21.4%) |
| Crush injury                             | 6 (7.1%) |
| Other                                    | 10 (11.2%) |
| Hospitalization required                 | N/A  |
| Yes                                      | 43 (51.5%) |
| No                                       | 41 (48.5%) |
| Mechanism of injury                      | N/A  |
| Fall from standing height                | 21 (25%) |
| Cut on sharp object                      | 15 (17.9%) |
| Heavy machinery                          | 14 (16.7%) |
| Sports/leisure                           | 12 (14.3%) |
| Crush injury                             | 9 (10.7%) |
| Other                                    | 13 (15.5%) |
| Employment status                        | N/A  |
| Full-time                                | 45 (54.2%) |
| Part-time                                | 16 (19.3%) |
| Other                                    | 22 (26.5%) |
Table 2. Summary of questionnaire scores

<table>
<thead>
<tr>
<th>Measure</th>
<th>Mean ± SD</th>
<th>Normative population mean</th>
<th>Reported range</th>
<th>Possible range</th>
<th>Cronbach Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>QuickDASH</td>
<td>4.51 ± 19.36</td>
<td>10.1 ± 14.7&lt;sup&gt;a&lt;/sup&gt;</td>
<td>5–89</td>
<td>0–100</td>
<td>0.867</td>
</tr>
<tr>
<td>PASS-20 (total score)</td>
<td>28.5 ± 15.75</td>
<td>24.04 ± 13.45&lt;sup&gt;b&lt;/sup&gt;</td>
<td>6–80</td>
<td>0–100</td>
<td>0.966</td>
</tr>
<tr>
<td>STAI T-Axiety</td>
<td>38.28 ± 9.59</td>
<td>36.55 ± 11.39&lt;sup&gt;c&lt;/sup&gt;</td>
<td>11–69</td>
<td>10–80</td>
<td>0.855</td>
</tr>
<tr>
<td>STAI S-Axiety</td>
<td>38.83 ± 10.83</td>
<td>33.16 ± 11.69&lt;sup&gt;d&lt;/sup&gt;</td>
<td>21–79</td>
<td>20–80</td>
<td>0.914</td>
</tr>
<tr>
<td>RRAQ</td>
<td>3.33 ± 7.89</td>
<td>N/A</td>
<td>14–47</td>
<td>9–53</td>
<td>0.867</td>
</tr>
</tbody>
</table>

QuickDASH: (Shortened version of Disability of the Arm, Shoulder and Hand); PASS-20: Pain Anxiety Symptoms Scale; STAI (State & Trait Anxiety Inventory); T-Axiety (Trait Anxiety); S-Axiety (State Anxiety); RRAQ (Recovery-Related Anxiety Questionnaire). Normative population values as reported in: <sup>a</sup>Humaker et al. 132; <sup>b</sup>Abrams et al. 133; <sup>c</sup>Crawford et al. [34].

Table 3. Correlations between disability and anxiety.

<table>
<thead>
<tr>
<th>Disability&lt;sup&gt;e&lt;/sup&gt;</th>
<th>State anxiety</th>
<th>Trait anxiety</th>
<th>Pain anxiety</th>
</tr>
</thead>
<tbody>
<tr>
<td>State anxiety&lt;sup&gt;e&lt;/sup&gt;</td>
<td>0.173</td>
<td>0.186</td>
<td>0.388**</td>
</tr>
<tr>
<td>Trait anxiety&lt;sup&gt;e&lt;/sup&gt;</td>
<td>0.344**</td>
<td>0.533**</td>
<td>0.582**</td>
</tr>
<tr>
<td>Pain anxiety&lt;sup&gt;e&lt;/sup&gt;</td>
<td>0.446**</td>
<td>0.588**</td>
<td>0.576**</td>
</tr>
</tbody>
</table>

Please see Methods section for abbreviations. <sup>e</sup>QuickDASH total score; <sup>f</sup>STAI S-Anxiety; <sup>g</sup>STAI T-Anxiety; <sup>h</sup>PASS-20 total score; <sup>i</sup>RRAQ total score.

<sup>a</sup>Correlation is significant at the 0.05 level (2-tailed).
<sup>b</sup>Correlation is significant at the 0.01 level (2-tailed).

T-Anxiety (42% > ISD; 15% > 2–3SD) while 67% of respondents reported higher than average S-Anxiety (41% > ISD; 26% > 2–3SD). Mean total score of the RRAQ suggests moderate to high levels of anxiety with 25% respondents reporting an average “moderate” level of anxiety on total score.

Bivariate analyses
Disability did not differ across injury types or other demographics. Associations between individual anxiety measures and disability are shown in Table 3. The measures of anxiety were significantly correlated in expected directions: there was a strong correlation between state anxiety and trait anxiety and moderate to strong correlations between both state and trait anxiety and all components of pain anxiety. Pain anxiety showed a significant association with disability. The total RRAQ score was also highly associated with disability.

Multivariate analyses
As a group, the four predictor variables accounted for 29% of the variability in self-reported disability ($R^2 = 0.290$, adjusted $R^2 = 0.253$, $F (4, 77) = 7.874$, $p = 0.001$). However, as shown in Table 4, only the total RRAQ total score explained a significant unique proportion of the variance in self-reported disability as an individual variable (19%).

Initial testing of RRAQ
Many of the individual RRAQ items demonstrated moderate to high correlations with disability (see Table 5). All participants reported a minimum of “a little bit” of worry or bother or at least one item while more than 70% of participants reported “quite a bit” or “extreme” worry or bother on two items or more (see Table 5). Face validity was supported by the high completion rate of the RRAQ (97.6%) and low rates of “N/A” response, 55.4% thought all items were applicable to them and 25.3% responded ‘N/A’ to one item, 13.4% to two items and 4.8% to three items.

Table 4. Regression analysis

<table>
<thead>
<tr>
<th>$R$</th>
<th>$\beta$</th>
<th>$t$</th>
<th>$p$</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>RRAQ total score</td>
<td>1.089</td>
<td>0.886</td>
<td>4.266</td>
<td>0.000</td>
</tr>
<tr>
<td>PASS-20 total score</td>
<td>0.237</td>
<td>0.949</td>
<td>1.311</td>
<td>0.189</td>
</tr>
<tr>
<td>T-Anxiety</td>
<td>-0.082</td>
<td>-0.041</td>
<td>-0.265</td>
<td>0.792</td>
</tr>
<tr>
<td>S-Anxiety</td>
<td>-0.208</td>
<td>-0.118</td>
<td>-0.785</td>
<td>0.435</td>
</tr>
</tbody>
</table>

Unstandardized ($R$) and standardized ($\beta$) regression coefficients, $p$ values and significance levels, and squared semi-partial correlations ($r^2$) for each independent variable in the regression model.

Table 5. Frequency responses for RRAQ and correlation of items with disability.

<table>
<thead>
<tr>
<th>Item</th>
<th>“Quite a bit”</th>
<th>“Extremely”</th>
<th>Correlation with disability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Problems with daily tasks</td>
<td>71% (44%)</td>
<td>37%</td>
<td>0.515**</td>
</tr>
<tr>
<td>2. Having pain (1–8)</td>
<td>37%</td>
<td>17% (20%)</td>
<td>0.567**</td>
</tr>
<tr>
<td>3. Appearance of my hand/arm’s finger</td>
<td>35% (14%)</td>
<td>12%</td>
<td>0.297**</td>
</tr>
<tr>
<td>4. Dependence on others (1–8)</td>
<td>35% (42%)</td>
<td>11%</td>
<td>0.354**</td>
</tr>
<tr>
<td>5. Decreased intimacy (1–8)</td>
<td>35% (12%)</td>
<td>12%</td>
<td>0.297**</td>
</tr>
<tr>
<td>6. Inability to play sport/instrument</td>
<td>35% (42%)</td>
<td>11%</td>
<td>0.354**</td>
</tr>
<tr>
<td>7. Job-related issues (1–8)</td>
<td>36% (36%)</td>
<td>11%</td>
<td>0.354**</td>
</tr>
<tr>
<td>8. Boredom – inordinate narcissity (1–8)</td>
<td>36% (43%)</td>
<td>11%</td>
<td>0.354**</td>
</tr>
<tr>
<td>9. Uncertainty about future function (1–8)</td>
<td>36% (36%)</td>
<td>11%</td>
<td>0.354**</td>
</tr>
<tr>
<td>10. Nightmares or flashbacks</td>
<td>5% (0%)</td>
<td>37%</td>
<td>0.515**</td>
</tr>
<tr>
<td>11. Attending medical appointments (1–8)</td>
<td>9% (0%)</td>
<td>37%</td>
<td>0.515**</td>
</tr>
</tbody>
</table>

$<$QuickDASH total score.
*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

Note that 84% of “N/A” responses were clustered around lifestyle arrangements that apply only to a portion of the general population (1. intimacy with partner, 2. inability to play sport or instrument and 3. job-related issues). Those participants who reported “quite a bit” or “extreme” worry or bother on two or more items also reported significantly higher levels of disability (mean QuickDASH score = 49.42) than those who did not (mean QuickDASH = 34.35; $t$ = 3.412, df = 80, $p = 0.000$). Total RRAQ score was moderately positively correlated with the other anxiety measures but the acceptable tolerances of the measures (as described above in the Statistical methods) suggest that they are testing different constructs.
Discussion

The results of this cross-sectional study indicate that patients with traumatic injuries typical of a hand therapy clinic report more recovery-related anxiety (including pain anxiety, state anxiety and context-specific anxiety) than general anxiety (trait anxiety) symptoms. In addition, recovery-related anxiety is more strongly correlated with higher levels of current disability than general anxiety symptoms for people with upper limb injuries that would be considered mild to moderate. These results suggest that it is important to identify recovery-related forms of anxiety in those with less severe injuries. Most previous literature evaluating the relationship between disability and psychological distress following traumatic upper limb injuries has focused on those with severe injuries and used measures reliant on symptoms of anxiety disorders specified by the DSM, which are often not directly related to the injury and may be more general in nature. Grunert and colleagues reported that 96% of those who had suffered severe upper limb injuries demonstrated at least one significant symptom of PTSD [35] while Whites found that nearly a third of patients seen in an outpatient hand therapy clinic met the diagnostic criteria for PTSD [17]. In contrast, only 6% of patients in our study reported nightmares or flashbacks. General anxiety rates have been more variable in previous studies of people with relatively severe injuries. Grunert found generalized anxiety in 31–48% of patients with severe hand injuries in the first 3 months following injury [1] while Gustafsson and colleagues found 22–32% of patients with injuries severe enough to require surgery demonstrate “possible” to “definite” anxiety [36,37]. In contrast, while a high proportion of the participants in our study reported mildly increased trait anxiety (57%), only 15% reported moderate to severe trait anxiety (>2 SD above norms). This may be due to the less severe nature of the injuries in our population, resulting in generally lower levels of physical and cognitive symptoms of general anxiety.

In contrast to the low rates of generalized anxiety, we found much higher reported rates of moderate to severe recovery-related anxiety. Approximately 68% of respondents reported higher than average state anxiety (anxiety since the time of injury) while 58% of respondents reported higher than average pain anxiety. Of those, 29% reported moderate to severe pain anxiety (>2 SD above norms) and 26% reported moderate to severe state anxiety (>2 SD above norms). In addition, approximately 25% of participants reported a ‘moderate’ amount of worry related to situational aspects of recovery specifically from an upper limb injury (RRAQ total score). These results may indicate that participants experienced, or were willing to report, more anxiety directly related to their injury as compared to general anxiety symptoms.

Current levels of disability were also associated with the extent to which questions on the measure related anxiety specifically to the injury and recovery experience. For instance, total scores from measures of anxiety that phrased items to be specific to the upper limb injury (RRAQ and PASS-23) were significantly correlated with disability while those asking about general symptoms of anxiety (T-Anxiety and S-Anxiety) were not. These results are in keeping with studies that have demonstrated a correlation between pain anxiety and disability [4,38]. However, our results are unique in that they indicate differences in the strength of correlations between disability and specific types of anxiety. In particular, current disability was most strongly associated with anxiety directly related to the recovery experience with weaker or non-significant associations with types of anxiety less directly related to the injury/recovery.

These associations between contextual anxiety and disability are reflective of the increased recognition that both personal and environmental (or contextual) factors make to the experience of disability. For instance, the World Health Organization’s International Classification of Functioning, Disability and Health positions “disability” as an individual experience that may include impact on bodily functions, restrictions in activities and general disruption to participation in valued roles [39]. Within this model of disability, each of these areas may be influenced by (and may influence) both personal and environmental or contextual factors. When the context of their injury is ignored in questions about anxiety, some individuals may find it difficult to relate their anxiety to bodily sensations (e.g. racing heart) or activity limitations (e.g. avoiding activities which cause pain).

With this in mind, the measures of anxiety used in this study may be ordered based upon the proposal emphasis that each of the measures places on contextual factors (defined in this case as the recovery from a traumatic upper limb injury):

1. RRAQ: specifically related to the experiences of recovering from an upper limb injury (activity limitations and participation in roles that have been identified by others as distressing [30]).
2. Pain anxiety: context is implicit (i.e. pain from injury).
4. Trait anxiety: focus on impact on bodily functions and activity limitations (no context).

Interestingly, thus ordering is in keeping with the prevalence and the strength of association with disability of each of these types of anxiety within our study population, recovery-related anxiety measured by the RRAQ being most prevalent and the most highly correlated with disability. These results may be useful in explaining the high rates of variability found in disability following upper limb injuries. In the current study worry about specific aspects of recovery alone accounted for 12% of the variability in disability scores. None of the other anxiety types measured in this study accounted for any percentage of the variability on an individual basis. This suggests that while anxiety in general plays an important role in the wide variation we see in reported disability, recovery-related anxiety may be even more important.

This study should be interpreted within its limitations. The RRAQ was developed specifically for this study and the data provide initial face and content validity for this tool. Further validation and reliability studies are now required to examine issues such as the scale’s responsiveness to change (to a following successful surgery). This study is limited to the study of those with minor to moderate traumatic upper limb injuries; there is a very well-established body of literature which examines many of the same issues in those with arm pain due to non-traumatic causes [4, 17, 22, 38, 40–48]. Studies of the validity of the RRAQ in such conditions or in those with severe injury may be useful and would allow comparisons of the recovery-related anxiety induced by different types of injury.

In addition, the utility of the RRAQ as a scale versus a screening tool should be examined further. For instance, levels of worry on individual items of the RRAQ are perhaps even more relevant to reported disability than total score: an individual might report no worry related to difficulty with daily tasks while reporting “extreme bother or worry” about uncertainty related to future function of the hand/arm. As Gustafsson et al. point out, “to be able to give adequate support to a patient in a stressful illness situation, it is important to know what causes stress in each particular situation” [30, p. 1334]. In this study, 70% of participants reported “quite a bit” or “extreme” worry in relation to specific aspects of recovery on one or more items of the RRAQ. Gathering this information could be useful to clinicians treating individuals with upper limb injuries as it would allow for more personalized care and treatment.
them to provide immediate input to the appropriate care manager, employer, family member or other healthcare provider in order to address the issue.

As is the case in most of the studies in this research area, this study did not use a formal classification for severity of injury [1-4,7,12,13,16,17,30,31,35-37,51]. Instead the designation of “moderate” injuries that is used to describe the nature of the injuries of most participants in this study is based upon a summary analysis of the information regarding injury collected with participant demographics in this study. This information included category of injury (i.e. wrist sprain, forearm fracture, finger fracture, etc.), requirement for surgical intervention (yes or no), and number of days spent inpatient following injury. This information was then compared with the injuries described in similar research studies. Results suggest that the injuries sustained by the sample in this study were less severe in nature than those reported in similar studies. For instance, 65.5% of our sample reported a forearm fracture, finger fracture, wrist or finger sprain as their primary diagnosis. Uncomplicated injuries of the nature are classified as minor to moderate injuries by a version of the most commonly used upper limb injury severity rating scale, the Hand Injury Severity Scale (HSS) [49] that has been modified to include injuries proximal to the wrist (the MeHSS) [50]. In contrast to this, many of the studies evaluating psychological distress cited in this paper are focused on those with injuries that would be classified as severe or major on this scale [1,7,12,31,35,51]. In addition, only 51% of participants of this study were admitted to hospital for their injuries while several of the studies cited in this paper report results for samples in which 100% of participants were admitted to hospital for inpatient care following injury [1,7,12,30,35-37,51], indicating a greater potential for serious injury. Although these comparisons provide a general indication of the severity of injuries included in this study, the conclusions of this study would be strengthened by a more specific indicator of the severity of injury incurred by participants, such as the Modified Hand Index Severity Score [49] and should be considered in future work.

Finally, the sample for this study was relatively small and different geographic regions or clinics may provide different responses to the areas of anxiety proposed by the RAAQ. The response rate of 51% may also have introduced some bias as, for example, those who did not respond may have had more anxiety or worse disability. However, the distribution of scores on all measures appears to be distributed normally. It is also possible that the fixed order of the measures in the questionnaires introduced some bias; it might be beneficial to vary the order of the measures in future studies.

This study provides preliminary evidence that anxiety related directly to the recovery experience may be common in those with minor to moderate traumatic upper limb injuries and that it may influence disability. Our attention is not to suggest that symptoms of anxiety disorders are an unimportant indicator of distress and outcomes in those with more severe injuries. Indeed, strong evidence has shown that symptoms of GAD and PTSD may play an important role in the development of disability and pain [1,3,11,51]. However, this study indicates that there are other forms of recovery-related anxiety that play a role in disability among those with less severe upper limb injuries.

Acknowledgements

The authors would like to thank the therapists who participated in helping to distribute questionnaires for this study and those who took the time to share their experiences by completing the questionnaires for us.

Declaration of Interests

This study was supported by a Disability Placement Program Grant from the New Zealand Health Research Council and by a PhD scholarship from the University of Otago.

References

23. Carleton RN, Asmundson GIG. The multidimensionality of fear of pain: construct independence for the fear of pain questionnaire-short
Appendix D

Study III Forms and Ethical Approval Documentation

Appendix D1: Ethical approval for Study III
Appendix D2: Māori consultation for Study III
Appendix D3: Consent form for Study III
Appendix D4: Invitation letter Study III
Appendix D5: Participant information sheet Study III
Appendix D6: Interview schedule
Appendix D7: Common stressors chart
Appendix D1: Ethical approval for Study III

27 January 2012

Ms Elizabeth Mayland
88 Maryhill Terrace
Maryhill
Dunedin 9011

Dear Ms Mayland

Ethics ref: LRS/12/EXP/003 (please quote in all correspondence)
Study title: Personal and environmental antecedents to post-injury distress following traumatic upper limb injuries

This expedited study was given ethical approval by the Chairperson of the Lower South Regional Ethics Committee on 19 January 2012.

Approved Documents

- National Application Form
- Study II: Research Protocol - version 1.0, dated 24 November 2011
- Consent Form for Participants - version 1.0, dated 25 November 2011
- Information Sheet for Participants - version 2, dated 25 November 2011
- Interview Schedule - version 1.0, dated 25 November 2011
- Letter of Invitation to the study, dated January 2012
- Checklist for the Fracture clinic nurse/outpatient therapist

This approval is valid until 19 January 2014, provided that Annual Progress Reports are submitted (see below).

Annual Progress Reports and Final Reports

The first Annual Progress Report for this study is due on the 19 January 2013. The Annual Report Form is available at www.ethicscommittees.health.govt.nz. Please note that if you do not provide a progress report by this date, ethical approval may be withdrawn.

A Final Report is also required at the conclusion of the study. The Final Report Form is also available at www.ethicscommittees.health.govt.nz.
We wish you all the best with your study.

Please do not hesitate to contact me should you have any queries.

Yours sincerely

[Signature]

Sam Skogerad
Administrator
Lower South Ethics Committee
LowerSouth_EthicsCommittee@moh.govt.nz
Appendix D2: Māori consultation for Study III

NGĀI TAHU RESEARCH CONSULTATION COMMITTEE
Te Komiti Rakahau ki Kai Tahu

24/01/2012 - 16
Tuesday, 24 January 2012

Dr Hay-Smith
Rehabilitation Teaching and Research Unit
Wellington

Tēnā koe Dr Hay-Smith

Title: Personal and environmental antecedents to post-injury distress following traumatic upper limb injuries.

The Ngāi Tahu Research Consultation Committee (The Committee) met on Tuesday, 24 January 2012 to discuss your research proposition.

By way of introduction, this response from the Committee is provided as part of the Memorandum of Understanding between Te Rūnanga o Ngāi Tahu and the University. In the statement of principles of the memorandum, it states "Ngāi Tahu acknowledges that the consultation process outlined in this policy provides no power of veto by Ngāi Tahu to research undertaken at the University of Otago". As such, this response is not "approval" or "mandate" for the research, rather it is a mandated response from a Ngāi Tahu appointed committee. This process is part of a number of requirements for researchers to undertake and does not cover other issues relating to ethics, including methodology; they are separate requirements with other committees, for example the Human Ethics Committee, etc.

Within the context of the Policy for Research Consultation with Māori, the Committee base consultation on that defined by Justice McGechan:

"Consultation does not mean negotiation or agreement. It means: setting out a proposal not fully decided upon; adequately informing a party about relevant information upon which the proposal is based; listening to what the others have to say with an open mind (in that there is room to be persuaded against the proposal); undertaking that task in a genuine and not cosmetic manner. Reaching a decision that may or may not alter the original proposal."

The Committee considers the research to be of importance to Māori health.

The Committee notes and commends that ethnicity data is to be collected as part of the research project using the questions contained in the 2006 census.

The Committee suggests dissemination of the research findings to Māori health organisations regarding this study.

We wish you every success in your research and the Committee also requests a copy of the research findings.
This letter of suggestion, recommendation and advice is current for an 18 month period from Tuesday, 24 January 2012 to 24 July 2013.

The recommendations and suggestions above are provided on your proposal submitted through the consultation website process. These recommendations and suggestions do not necessarily relate to ethical issues with the research, including methodology. Other committees may also provide feedback in these areas.

Nāhaku noa, nā

Mark Brunton
Kaitakawaenga Rangahau Māori
Facilitator Research Māori
Research Division
Te Whare Wānanga o Otago
Ph: +64 3 479 8738
e-mail: mark.brunton@otago.ac.nz
Web: www.otago.ac.nz

The Ngāi Tahu Research Consultation Committee has membership from:

Te Rūnanga o Ōtākou Incorporated
Kāti Huirapa Rūnaka ki Puketawhero
Te Rūnanga o Moeraki
Appendix D3: Consent form for Study III

Consent Form for Participants

Study: The experience of recovering from a hand, wrist, or elbow injury

I have read the Information Sheet dated 4/2/13 that describes this study and I have had the opportunity to discuss the study with the primary researcher (Beth Mayland). I am satisfied that any questions I had about the study have been answered and I know I am free to ask further questions about the study. I understand the purpose of the study and the type of information that I will be asked to provide during the interview. I understand that my decision to participate or not participate will have no impact on my treatment for my hand or arm injury.

I also understand that:

• My participation in the study is entirely voluntary.
• I have had the opportunity to use whānau support or to have a relative or friend help me ask questions about the study.
• I am free to withdraw from the study or decline to answer any question at any time.
• I will receive a grocery voucher worth $50 to compensate me for my time and travel.
• If I become upset during the interview and choose to continue, the researcher will provide an opportunity at the end of the interview to discuss why I became upset and may provide some options for ways to address any issues.
• Any personal identifying information (name, hospital reference number, injury type) will be coded and only the primary researcher will have access to this information.
• This interview will be audiorecorded and any raw data (audiorecordings and transcripts of the interview) will be retained in a locked cabinet for 10 years, after which they will be destroyed.
• I may be contacted by the researcher following my interview to clarify my answers or to extend an invitation to attend a short presentation of the results for participants.
• The results of the study may be published and will be available in the main researcher’s PhD thesis in the University of Otago Library (Dunedin, New Zealand) but every attempt will be made to preserve my anonymity.
• I can request a copy of the results of the study after it is completed.
• If I do have any questions, I can contact Beth Mayland (the main researcher) on weekdays between the hours of 8:00am and 5:00pm at (03) 471 6942. Or by email at mayel636@student.otago.ac.nz.

I agree to take part in this study.

____________________________________________
(Signature)

________________________________________
(Printed Name)

____________________
(Date)

This study has been approved by the Lower South Regional Ethics Committee.

Reference Number:  
Date:
Appendix D4: Invitation Letter Study III

February 2013

Dear Potential Participant,

I am writing to invite you to participate in a study about the experience of recovering from a hand, wrist, forearm or elbow injury. You are receiving this letter because you recently visited Otago Hand Therapy, Ltd. Recovering from an injury can have an impact on many different areas of your life. The goal of this study is to learn more about these impacts by interviewing people who have experienced an injury. This information may help healthcare workers to provide more appropriate and specific support to people who are going through a similar situation. This study has received ethical approval from the Lower South Regional Ethics Committee.

If you choose to take part in this study, you will be contacted by me (Beth Mayland) to schedule an interview. The interview may be held at the University of Otago or somewhere else that you choose. The interview will last about an hour. However, you may be contacted by phone one additional time to clarify any points you made. During the interview, I will ask you to describe what the experience of recovering from your injury has been like. You may choose not to answer any question during the interview and may stop the interview at any time and for any reason. In recognition of your time and participation, you will receive a grocery voucher worth a total of $50 after the interview.

With this letter is a postage paid envelope and letter for you to return, indicating whether or not you are interested in being involved in this study. Please take a minute to fill it out and send it back to us. If we have not received this letter in 2 weeks, we will give you one call to answer any questions you may have and to see if you are interested in participating. If you have any further questions about the study, please feel free to give me a call weekdays between 9am and 5pm at (03) 471 6942 or at mayel636@student.otago.ac.nz.

Thanks very much for your time and best of luck for a speedy recovery from your injury!

Regards,
Elizabeth (Beth) Mayland
Principal Researcher
Appendix D5: Participant information sheet Study III

Recovering From an Upper Limb Injury

INFORMATION SHEET FOR PARTICIPANTS

Consent Form Date: 4-2-13

Thank you for your interest in this study. This information sheet tells you about our study and what will happen if you decide to take part. Please read all of the information carefully before you decide whether or not you want to be involved. If you do decide to participate, we thank you for your time and your thoughts. Please note that you do not have to take part in this study. If you decide not to participate, there will be no disadvantages to you of any kind. If you are still in hand therapy, there will be no impact on the treatment you receive.

Aim of the project

The aim of this project is to explore in depth the emotional and practical impact that recovery from hand, wrist, or elbow injuries may have on the lives of those who sustain them. We are particularly interested in what aspects of the process might have been stressful for you (i.e. being unable to work, uncertainty about how your hand might work in the future, etc.). This study is being completed as part of the thesis requirements for a Doctor of Philosophy degree.
What types of participants are being sought?

We will be asking individuals who have sustained a traumatic injury to their hand, wrist, forearm, or elbow within the past three to five months and who are older than 18 years of age to participate. Because the interviews will be conducted in English, we are also looking for people who are able to converse fluently in English. You may not be eligible to participate if your hand or arm problem is caused by a disease like Rheumatoid Arthritis or has gradually built up over time due to your work environment. You will also not be asked to participate if you have a diagnosed mental health condition (like depression or post-traumatic stress disorder).

What will you be asked to do if you participate?

If you do decide to take part in the study, you will be placed on a list of potential participants. We will then contact individuals by phone to formally invite them to participate in the study. Please note that you may not be contacted to participate even if you indicate that you are interested. Because we are trying to obtain a diverse range of experiences, we will be choosing participants who are different in some way (i.e. age, severity of injury, gender, type of injury) from those we have already interviewed. In order to do this, we do need a large group of participants to select from so we appreciate your willingness to participate even if you are not chosen for an interview!

If you are interviewed, this should take about 60-90 minutes to complete. You will be asked your preference for where the interview will take place. Some options include the University of Otago Psychology Department or another location of your choice. At the end of the interview you will be given a chance to ask any questions or present any concerns. The interviewer may also contact you to clarify any of your answers following the interview.

Benefits of the study
There are no direct benefits to you for participating in this study. However, we hope that the information gained in this study will give health professionals a better idea about which aspects of recovery from a traumatic upper limb injury are most distressing to people so that we can help to address these issues better in the future.

Risks of the study
There is risk that you may become upset by thinking about the impact that your injury has had on your life or about the distress that you may experience. We will provide you with a list of potential resources to help you to address any issues you identify during the interview and may be able to steer you in the right direction if you need additional assistance.

Can participants change their mind and withdraw from the study?
You may change your mind and withdraw from the study at any point without any disadvantage to you. You may also choose not to answer any question posed to you during the interview without any negative effects to you.

What information or data will be collected and what use will be made of it?
We will ask you to describe what the experience of recovering from a traumatic injury has been like for you. In particular, we are interested in what aspects of the recovery may have been more challenging or distressing to you and why you felt that these particular areas presented a challenge.

All data will be stored in such a way that only the investigators in the study will be able to access it. Note that your information will be coded so that the identity of each individual will only be matched to the responses by the researchers. The results of the study may be published, but no material that could personally identify you will be used in any reports on this study. You are welcome to request a copy of the results of the project.

If I need someone to help me decide, whom should I talk to?
You may have a friend, family member, or whānau support help you read through the information to help you to understand the benefits and risks of the study. You may also bring a family member or whānau support to the interview if you wish.

If you have any other questions or concerns about this study, you may contact a Health and Disability Services Consumer Advocate at (03) 479 0265 or free phone at 0800 33 77 66. They can also be reached at free fax 0800 2787 7678 (0800 2 SUPPORT) or by email at advocacy@hdc.org.nz.

If you have a concern or issue that is Māori specific, please contact Linda Grennell at 0800 377 766.

**Compensation**

You will receive a grocery voucher worth $50 as reimbursement for your time and travel for this study. In the unlikely event of a physical injury as a result of your participation in this study, you may be covered by the accident compensation legislation with its limitations. If you have any questions about ACC, please feel free to ask the researcher before you agree to take part in this study.

**Where can I get more information about the study?**

Beth Mayland
PhD candidate
Rehabilitation Research and
and Teaching Unit
University of Otago
Tel (03) 471 6942
Email mayel636@student.otago.ac.nz

Dr. Jean Hay-Smith
Senior Lecturer
Rehabilitation Research
and Teaching Unit
University of Otago
Tel (03) 474 7007 extension 8568
Email jeansthay-smith@otago.ac.nz

**Statement of approval**

This study has received ethical approval from the Lower South Regional Ethics Committee, Ethics reference number LRS/12/EXP003.
Investigators

Beth Mayland, PhD candidate
Jean Hay-Smith, Senior Lecturer, Rehabilitation Research and Teaching Unit
Gareth Treharne, Senior Lecturer, Department of Psychology
Appendix D6: Interview Schedule

I am a researcher from the University of Otago and I am interested in what the experience of recovering from a hand or arm injury is like for people. I became interested in this when I was working as a hand therapist and saw that recovering from a hand/wrist/elbow injury can have a big impact on different parts of your life. I have had some people tell me that this can be distressing. However, it seems that different parts of the experience are distressing for different people. I am interested today in what your experience has been like and how this injury may have had an impact on various aspects of your life.

Let’s start with your injury:

- Can you tell me about what happened when your injury occurred?
  - Prompt: Where were you? What were you doing?
- What did you do immediately after it happened?
  - Prompt: Did you see a doctor right away?
- What has your treatment involved so far?
  - Prompt: Did you have to have surgery? Stay overnight in the hospital? Did you have a cast or a splint?
- What were you feeling as you were going through all of these things?
What was your everyday life like in the first three months after your injury?

- What kinds of things were difficult for you to do? How did this impact on your day?
- Tell me how you got on managing your normal routine.
  - Prompt: In what ways did you need to adapt your routine?
- How did you feel about that?

[Tell me a little bit about what kind of work you do or what roles you have in your life. Are you working at the moment? Do you have any children at home that you take care of?]

What impact did your injury have on your job? And by “job” I mean paid work, volunteer work, working at home, or taking care of your children?

- How did you feel about that?

How did your injury impact your relationships?

- Don’t see friends as much because not able to join for sports? Etc.
- Unable to help out as much at home?
- What about intimacy with your partner?
- How did you feel about this?

What would you say was the most stressful part of recovering from this injury for you?

So we may have covered some of these already, but this is a list of things that other people have told us have been stressful or bothersome for them while recovering from an injury like yours. Tell me about any experiences these categories remind you of.

- Completing daily tasks
- Pain
- Intimacy with partner
- Nightmares about injury experience
- Issues related to work
- Involuntary inactivity/Boredom
- Feelings about future function of my hand/wrist/elbow
- Attending medical procedures and appointments
- Participation in sports/hobby

What else would you like to say about what it has been like to have an arm injury and to go through this experience?

What advice would you give to someone who’s had an injury like yours?
## Appendix D7: Common stressors table from interview

<table>
<thead>
<tr>
<th>Difficulty completing everyday tasks</th>
<th>Pain</th>
<th>Decreased intimacy with partner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nightmares or flashbacks of injury</td>
<td>Issues related to work</td>
<td>Boredom or inactivity</td>
</tr>
<tr>
<td>Feelings about future function of hand</td>
<td>Attending appointments related to injury</td>
<td>Unable to participate in usual activities</td>
</tr>
</tbody>
</table>
Appendix E

PSYCHOLOGICAL DISTRESS AND DISABILITY FOLLOWING GENERAL TRAUMATIC UPPER LIMB INJURIES

Elizabeth Mayland (MSc)1,2,3, Jean Hay-Smith (PhD)1,2, Gareth Treherne (PhD)1,3
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Introduction
- Psychological distress is common following traumatic injury
- Symptoms of posttraumatic stress disorder are prevalent in 30-60% of those with severe upper limb injuries and nearly half of those with less severe injuries in the first year after injury2,4
- Psychological distress following trauma is linked with higher levels of disability and increased pain5
- It is not clear if other forms of distress have the same impact on recovery

The primary aim of this study was to explore the relationship between psychological distress and disability following traumatic upper limb injury.

Methods
Cohort and study design
Cross-sectional study including single administration of written self-report questionnaires.
- Sequential portion of Otago Hospital Outpatient Physiotherapy Department with traumatic upper limb injury attended/referred.

Measures
- Anxiety measures
  - State and Trait Anxiety Inventory (STAI): Measures trait anxiety (T-Axis) or the propensity to respond generally to any stressor, state anxiety (S-Axis), or anxiety related to a specific experience
  - Pain Anxiety Symptoms Scale (PASS-20): Quantifies cognitive and behavioral reactions to pain
  - Illness Perceptions Questionnaire (IPQ-R): Measures cognitive and emotional reactions to injury
- Sources of Worry Questionnaire (SWQ): Identifies 13 items of worry identified in previous studies that are trauma-related or injury-related and asks respondents to rate the extent to which each worry is a problem for them

- Outcome measure (disability)
  - QuickDASH: Self-report measure of disability following upper limb injury

Results
- N = 43 (29 male, 14 female; 31汉族, 12 Caucasian); Age range: 18-77 (mean age: 45; SD: 13)
- Overweight side injured: 31 (72%)

Part 1: Reported anxiety
- High levels of anxiety (T-Axis) and worry (S-Axis) were reported by the majority of participants

Part 2: Correlations between disability and anxiety
- Correlation between anxiety measures and disability:
  - Disability correlated with both state and trait anxiety
  - Disability also correlated with worry (S-Axis)

Part 3: Predicting disability
- A multiple regression model showed that anxiety variables accounted for 26% of the variance in total QuickDASH score (F (3, 39) = 3.21, p < 0.05). However, using the SWQ-TRAS model scores explained a significant portion (variance in QuickDASH score as an individual factor: 5%).

Conclusions
Self-reported disability was most strongly correlated with cognitive responses to injury, experience and recovery (SWQ-TRAS), while general anxiety (STAI) was not significantly correlated with disability. In keeping with previous reports, general anxiety scores were higher for patients in this group overall. However, only 56% of the population reported "worry a lot" or "worry a great deal" about at least one injury-related stressor, suggesting that disability related to worry may vary between patients. The results of this study suggest that psychological distress may be associated with disability following traumatic injury, and warrant further research to determine the specificity of the relationship.

References

Acknowledgments
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Appendix F

### SOURCES OF DISTRESS FOLLOWING MINOR TO MODERATE TRAUMATIC UPPER LIMB INJURY

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### Results

Many of what might appear to be obvious sources of distress were actually cross-cut between the four main themes: 1) Uncertainty, 2) Disruption, 3) Identity and 4) Legitimacy:

<table>
<thead>
<tr>
<th>Theme</th>
<th>1) Uncertainty</th>
<th>2) Disruption</th>
<th>3) Identity</th>
<th>4) Legitimacy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pain</strong></td>
<td>Lack of understanding</td>
<td>Disruption to routine</td>
<td>Loss of identity as young, healthy person</td>
<td>Pain does not contribute to legitimacy of injury</td>
</tr>
<tr>
<td><strong>Work-related issues</strong></td>
<td>Future job prospects</td>
<td>Disruption to treatment</td>
<td>Loss of identity as productive member of team</td>
<td>Pain was incredibly painful, but I've phased it</td>
</tr>
<tr>
<td><strong>Appearance</strong></td>
<td>Uncertainty about integrity of finger</td>
<td>Disruption to normal relationships</td>
<td>Loss of self as productive family member</td>
<td>I think I've been told about the importance of</td>
</tr>
<tr>
<td><strong>Difficulty with functional tasks</strong></td>
<td>Uncertainty about function of hand</td>
<td>Disruption to daily routines</td>
<td>Loss of self as reflected through inability to complete daily tasks</td>
<td>of doing things with my left hand and it is</td>
</tr>
<tr>
<td><strong>Rehabilitation</strong></td>
<td>Understanding of pain and process</td>
<td>Impact of reduced daily life</td>
<td>Identity of self as &quot;bad patient&quot; due to difficulty adhering to restrictions</td>
<td>a pain trying to just things so you know it</td>
</tr>
</tbody>
</table>

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### Participants & Methods

- **Participants**: 13 participants (7 men, 6 women; age range: 21-70) who had sustained a traumatic hand, wrist, forearm or elbow injury within the past 8 years.
- **Recruitment**: From the Dunedin Hospital Fracture Clinic and Occupational Therapy Department.
- **Participated in one-on-one semi-structured interviews exploring their experiences of sustaining and recovering from their injury.
- **Data analysis**: Using thematic analysis techniques described by Braun & Clarke (2006) to search for themes around worry/distress.

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### Conclusions & Key Messages

- Psychological distress following minor to moderate traumatic upper limb injuries encompasses many different aspects of life.
- Although distress may be related to the obvious interruptions in physical capabilities, the reason such impurrts and activity limitations (whilst potentially minor/temporary) are disturbing is the underlying worry about less observable issues: identity loss, uncertainty, disruption to routines and questions about the legitimacy of the injury.
- These insights are important for therapists, surgeons, and psychologists who may be working with individuals with traumatic upper limb injuries in order to be able to identify potential trajectories of distress and provide appropriate support.

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References:

Appendix G

My hand! Multi-faceted appearance-related distress following traumatic upper limb injury

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Background & Significance
- Psychological distress following traumatic upper limb injuries is common and is often associated with increased disability and pain.
- The sources of this distress are not clear.
- Gustafson and Alldrin 2004 identified facets of recovery that were reported as sources of psychological distress by participants with chronic upper limb injuries.
- The aim of this study was to identify aspects of recovery from minor to moderate traumatic upper limb injuries that cause distress.

Participants & Methods
- 11 participants who had sustained a traumatic hand, wrist, forearm or elbow injury within the past 6 months.
- 7 men, 4 women, age range 21 to 79 years old.
- Recruited from the Dunedin Hospital Fracture Clinic and Outpatient Physiotherapy Department.
- Participated in one 60-90 minute semi-structured interview exploring their experiences of sustaining and recovering from their injury.
- Data were analyzed using thematic analytic techniques described by Braun & Clarke (2006) to search for themes around worry/distress.

Conclusions & Key Messages
- Appearance-related distress appears to be incorporated into both personal and social aspects of recovery from traumatic upper limb injuries.
- Recognition of the impact of this multifaceted source of distress may encourage healthcare workers to address appearance issues during treatment both with patients and with family members.

Appearance-related distress following traumatic upper limb injury was interwoven within 4 distinct themes:

Reinforcement of injury
- "I sort of forgot about this and I was walking up the hill and I pulled it and it hurt and I thought, 'Oh no, it's back'."
- "I was running and then I thought, 'Oh no, it's back'"

Reactions of others
- "Once the bandages etc... they level of concern obviously drops away because they can't see anything wrong with you."
- "I've never seen anyone so upset."

Uncertainty about integrity of finger
- "I thought I'd dislocated it and I thought by gripping the box that might have, that just, well it did. It seemed to work alright 'cos I kept my, my thumb back on, it didn't want to look at my finger again and I keep my glove on."

Uncertainty: distress related to the unknown and unfamiliar aspects of recovering from a traumatic injury

Legitimacy: worry or bother surrounding the legitimacy of the injury; both in terms of participants' own views of the legitimacy of their injury and the legitimacy that others attributed to their injury

Identity: the influence that upper limb injuries had in shaping how participants felt about themselves as family members, coworkers, functioning members of society, and as healthy, vibrant human beings

Disruption: frustrations relating to an interruption or forced change to established, routines or "normal" activities

- "They sent me home with like all these little things to change the dressing myself or my Mum because I couldn't do it. So my Mum had to do it, and she's like got the weakest stomach ever so she just had to try not to look too much while she did it."

References

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