Health anxiety and older adults: A cross sectional study comparing predictors of health anxiety between an older and younger cohort

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Abstract

Health anxiety is a universal experience ranging from adaptive concerns about physical health to debilitating worry that may merit clinical diagnosis. Little is known about health anxiety in older adults and the overall objective of this study was to contribute to the nascent literature in this subject.

The present study was conducted within a cognitive framework that emphasises the perception of bodily sensations in the origin and maintenance of health anxiety. The research comprised three interrelated studies. The principal investigation examined body perception (anxiety sensitivity, body vigilance and somatosensory amplification) variables as predictors of health anxiety across two cohorts. These findings were supported by assessment of the factor structure of measures of health anxiety and body perception in the older cohort. Finally, a measure of attention to bodily sensations in health anxiety (BVS-H) was trialled.

The study was a self-report survey measuring demographic, physical health, current distress, body perception and health anxiety variables, which was administered to 221 adults over 65 and a comparison group of 177 adults aged 18 – 30.

Regression analyses showed that consistent with the cognitive model, body perception predicted health anxiety. Body vigilance predicted health anxiety in both groups. The amplification of bodily sensations was a more important predictor of health anxiety for older adults. Inter-relationships between anxiety sensitivity, body vigilance and health anxiety in the older cohort, differed from expectations and warrant further study. The effects of control variables varied between groups with worry emerging as a predictor only for the older cohort. Physical health predicted health anxiety, but contributing variables differed between cohorts. Pain was a predictor for both groups, but physical illness was a predictor only for the younger cohort. Consistent with prior studies, older adults reported lower levels of health anxiety than the younger cohort. Factor analyses supported the structure of health anxiety, body vigilance and somatosensory amplification measures. Factor analysis of the anxiety sensitivity measure was inconclusive. BVS-H measure gave satisfactory results.

These findings support the cognitive theory of health anxiety as an explanatory model of health anxiety in older adults and highlight cohort differences in variables contributing to health anxiety.

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CHAPTER 1 - INTRODUCTION

"You should talk to my mother"

When my interest in health anxiety in older populations began, many people said "you should talk to my mother" implying that adults become more health anxious with age. Stereotypes of the health anxious or hypochondriacal older adult abound and are sustained in the psychiatric literature which places hypochondriasis as one of the seven most common "geriatric psychiatric syndromes" and further describes hypochondriasis as "one of the more common and frustrating of the somatoform disorders encountered by health care professionals" (Blazer, 2008, p. 1464). Paradoxically however, notes given in DSM-IV on differential diagnosis for hypochondriasis dismiss health anxiety observed in older adults as more likely "realistic" or manifestation of a mood disorder (American Psychiatric Association, 2000). In 2001, Snyder and Stanley observed that very little was known about health anxiety in older people. An initial review of the literature revealed that this situation had not substantially changed in the ensuing years. Given the inadequate and possibly contradictory understanding of health anxiety in older adults, the current study aims to provide an exploration of this intriguing topic.

Worry about health occurs across all age cohorts and is a normal and adaptive response to changing bodily states (Taylor & Asmundson, 2004). For most people these worries are transient, but for others the worries become persistent and debilitating and may manifest as health anxiety or hypochondriasis (Taylor & Asmundson, 2004; Warwick & Salkovskis, 1990). The occurrence of elevated health anxiety is uncertain, but estimates show prevalence between 6% and 13% in the general population and may be greater in older adults (Creed & Barsky, 2004). Not in doubt are the negative outcomes of elevated health anxiety, which include high levels of functional disability, morbidity, psychiatric distress and health care use (Creed & Barsky, 2004). In common with a majority of Western countries, the population of New Zealand is aging. Ministry of Health New Zealand, estimates that people over 65 will form 25% of the population by 2050 (Fletcher, 2002). The combination of possible increased health anxiety in older age, associated negative outcomes and a burgeoning population of older adults, advocates for health anxiety in older age as an important field of study.

A body of research indicates older people experience mental distress differently to younger cohorts (Bryant, 2010; Wolitzky-Taylor, Castriotta, Lenze, Stanley, & Craske, 2010), which raises the possibility that there are differences in the expression of health anxiety with increasing age. Health anxiety is currently understood within an empirically supported cognitive behavioural model (Marcus, Gurley, Marchi, & Bauer, 2007; Salkovskis, 1996). Although this model is largely untested in older adults (Snyder & Stanley, 2001), a prior study by the author (Boston & Merrick, 2010), found preliminary support for the cognitive model of health anxiety in a population of older adults.

There is evidence that cognitive features of anxiety have increased salience with age (e.g., Roberts, 2010), which raises the possibility that cognition is an important feature of health anxiety in older adults. Physical change is an inevitable part of aging, leading to the speculation that cognitive assessment of these changes (body perceptions) may contribute to health anxiety in different ways to those found in younger cohorts. Knowledge of such differences could provide insight into the mechanisms of health anxiety and inform therapeutic interventions.

The overall purpose of this study is to contribute to the nascent literature on health anxiety in older adults, by examining relationships between body perception and health anxiety within a cognitive behavioural framework. The current study also provides preliminary evidence of differences in health anxiety between cohorts, by comparing older adults with a cohort of adults under 30 years old.

An important issue in older adult research is the paucity of empirically validated measures (Wolitzky-Taylor et al., 2010). To provide support for the findings of the principal study, factorial validity of selected existing measures of health anxiety and body perception constructs are examined in a preliminary phase of the study.

According to the cognitive behavioural theory, attention to bodily sensations is a fundamental feature of health anxiety. Extant measures of this construct have been developed for panic but not health anxiety. The final aim of the current study is to trial a measure of attention to sensations found in health anxiety.

Structure of the Thesis

In order to provide a context for the later discussion on older adults, the first chapters of this thesis provide an overview of health anxiety in the general population. First, health anxiety is placed in an historical context and the definition adopted for the

current study is clarified. Next, the epidemiology of health anxiety is addressed. This section examines prevalence of health anxiety in both the general population and older adults, and backgrounds the later discussion of health anxiety in older adults. Chapter Three outlines theoretical formulations of health anxiety. Models from the health psychology, psychiatry and clinical psychology are examined with particular emphasis on cognitive models. This chapter concludes with a discussion of the body perception constructs of interest in the present study. Chapter Four brings the focus specifically to older adults. The discussion begins with a brief review of theories of aging and contemporary understanding of distress in older adults. Extant research on older adults and health anxiety is reviewed next with particular focus on the cognitive model and body perception constructs. Chapter Five reviews measurement of key constructs in the study. Chapter Six provides an overview of the literature and the specific shortcomings in the existing literature. The chapter concludes with the study aims and research questions for the present study

Chapter Seven describes the methodology and survey development, together with the results of a trial survey, carried out to test the acceptability of the questionnaire. This chapter also includes a description of the analytic strategies employed in the research. Chapters Eight and Nine provide results of the three investigations. The final chapter discusses the research results and positions the findings within theoretical frameworks. Limitations of the current research and suggestions for future studies are also included. The thesis concludes with an executive summary of findings.

CHAPTER 2 - HEALTH ANXIETY

"Hypokhondria - the soft parts of the body below the ribs where melancholy was thought to arise"

The Concise Oxford Dictionary of Current English

Positioning the topic of research within the psychological literature is an essential starting point for any research. This chapter begins with an examination of the historical precedents to health anxiety, which leads on to an overview of ongoing controversies in diagnosis and the contemporary understandings of health anxiety. The end of this first section gives a glossary of terms found in the literature review and the definition of health anxiety is delineated.

The second section of this chapter examines the epidemiology of health anxiety in the general population. As noted in the introduction, there is limited understanding of health anxiety in older adults and this section briefly reviews the likely prevalence of health anxiety in the general population and older adults. The remainder of this section focuses on research in the general population to provide a background for the examination of the older adult literature in Chapter 4. The chapter concludes with a description of factors contributing to, and debilitating consequences of, health anxiety for the individual.

History and Definitions

The English physician Sir Richard Blackmore wrote in *A Treatise Of The Spleen And Vapours: Or, Hypochondriacal And Hysterical Affections* (1725), that hypochondria was commonly regarded as an "imaginary and fantastick Sickness of the Brain, filled with odd and irregular ideas" and people with hypochondria were "an object of Derision and Contempt" (cited in Berrios, 2001, p. 9). These negative perceptions continue today, with the label of "hypochondriac" carrying connotations of "imaginary disease" or "malingerer" (Lipsitt, 2001), and even, in these times of constrained resources, an "enemy of the state" (Pilowsky, 1997). This section will trace the historical trajectory from hypochondriasis through ongoing controversies to the modern concept of health anxiety.

Hypochondriasis

Arguably, the history of hypochondriasis traces the history of medical thinking on the aetiology of mental distress and disorder (Berrios, 2001). The history tracks from the wandering uterus theories of the Greeks, to vapours of the spleen, nervous disturbance,

classification of disease and debate about the notion of insanity (Berrios, 2001). The purpose of this review is not to provide detailed explanation of these theories, but to show how history has informed, and continues to contribute to debate about the nature of hypochondriasis.

The concepts of hysteria, somatisation and hypochondriasis have a common history and were described in Egyptian and Greek writings as a "mystifying" number of heterogeneous symptoms arising from a wandering uterus (Berrios, 2001; Micale, 2008; Woolfolk & Allen, 2007). Theories of the wandering uterus from Galen and Hippocrates survived until the 17th and 18th centuries when theories of aetiology started to move from bodily disease to a dysfunction of the nervous and emotional systems (Noyes, 2011).

By the 17thcentury, uterine theories of hysteria and hypochondriasis had been superseded and hypochondriasis was considered to have neuropsychological origins and symptoms that could be confused with physical disease (Berrios, 2001; Micale, 2008; Woolfolk & Allen, 2007). At this stage, hypochondriasis and hysteria were still generally considered physical diseases and not a form of insanity; although Burton (1621/1832) noted the similarities between hypochondriasis and melancholy (depression). He described "hypochondriacal melancholy" as vague physical symptoms and noted that

> Some are afraid that they shall have every fearful disease they see others have, hear of, or read, and dare not therefore hear or read of any such subject, no not of melancholy itself, lest by applying to themselves that which they hear or read, they should aggravate and increase it (Burton, 1621/1832, p. 296).

William Cullen hypothesised that all disease originated in the nervous system and noted that hysteria and hypochondriasis was characterised by depression and anxiety (Berrios, 2001). By the 19th century, hypochondriasis was classified as insanity and a disorder of brain function.

Explanations for hypochondriasis developed during the 1800s were remarkably similar to those found today. Hypochondriasis was variously considered to be, a form of depression (Berrios, 2001), anxiety about health and a disorder of attention (Winslow, 1860) and a result of persistent attention to bodily sensations (Von Feuchtersleben, 1845). During this period "morbid sensibility of nerves" and "imagination" were considered crucial components of hypochondriasis, (Noyes, 2011). Later, Savage (1892) wrote that hypochondriasis was poorly defined, probably existed on a continuum and was "nervous

disorder varying from a slight over-sensitiveness to insanity with marked delusions and actively suicidal tendencies" (p. 609).

The history of hypochondriasis began to intersect with the history of psychoanalysis when Freud and Breuer published their seminal work *Studies in Hysteria* (1895), which gave intra-psychic explanations of hysteria, although interestingly, not hypochondriasis (Lipsitt, 2001; Woolfolk & Allen 2007). It was, however, from this basis that psychodynamic explanations of hypochondriasis were developed, which are explored further in Chapter Three.

During the 1960s there was considerable debate about the nature of hypochondriasis. A highly influential explanation was offered by Pilowsky (1967, 1997). Drawing on the wider concept of illness behaviour, Pilowsky proposed that hypochondriasis should be considered *abnormal illness behaviour* and developed a phenomenological framework for understanding hypochondriasis. Pilowsky's concept of abnormal illness behaviour was particularly important in the development of contemporary understanding of hypochondriasis and somatisation. Pilowsky's description not only attempted to move away from the negative connotations of hypochondriasis but also emphasised the importance of body perceptions in the aetiology of abnormal illness behaviour. This important theoretical conceptualisation is addressed further in Chapter Three.

Although hypochondriasis has been part of the landscape of mental distress since the 19th century, it was not until 1968 that *Hypochondriacal Neurosis* was formally recognised and defined in the second edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-II, American Psychiatric Association, 1968). This definition focussed on bodily preoccupation and fear of having a disease and included persistence of disease beliefs in spite of medical reassurance. Over subsequent revisions of the DSM, the definition has been refined, to include a minimum duration of symptoms and restrictive rules for differential diagnosis that exclude hypochondriasis occurring as part of medical conditions and other disorders.

Formalisation of diagnostic criteria led to increased interest in models explaining hypochondriasis. Barsky and Klerman (1983) proposed four ways of conceptualising hypochondriasis

> 1) as a psychiatric syndrome composed of "functional" somatic symptoms, fear of disease, bodily preoccupation, and the persistent pursuit of medical care, 2)

> psychodynamically, as a derivative of aggressive or oral drives or as a defense against guilt or low self-esteem, 3) as a perceptual amplification of bodily sensations and their cognitive misinterpretation, and 4) as socially learned illness behaviour (Barsky & Klerman, 1983, p.273).

Modern theories of hypochondriasis include these psychodynamic, interpersonal, somatic amplification, cognitive behavioural and biopsychosocial features which are often refinements of historical explanations. Models emphasising the amplification of and attention to bodily symptoms for example, resemble conceptualisations by von Feuchtersleben (1845) and Winslow (1860). Additionally, cognitive behavioural explanations echo nerve sensibility and disordered imagination hypotheses of the 19th century (Noyes, 2011). As Kenyon (1965) noted, contemporary discussion about the nosology and aetiology of hypochondriasis is not new, and; "much that has been put forward as new is often, in reality, only older historical ideas in new dress" (p.117).

Hypochondriasis has been and continues to be controversial and a brief exploration of the current debates follows.

Controversies in diagnosis

Under DSM-IV-TR (American Psychiatric Association, 2000) criteria, diagnosis of hypochondriasis requires preoccupation with and misinterpretation of bodily symptoms leading to fears of serious disease. These fears should persist for six months or more, severely affect function and be non-delusional. Criterion B requires that fears persist in spite of "appropriate medical evaluation and reassurance". Finally, a diagnosis of hypochondriasis is not permitted if the disease fears and preoccupation are better accounted for by another mood, anxiety or somatoform disorder.

There is an extensive literature that is critical of current diagnostic criteria for hypochondriasis (e.g., Collimore, Asmundson, Taylor, & Abramowitz, 2009; Noyes, Stuart, & Watson, 2008; Rachman, 2001; Starcevic, 2001; Williams, 2004). Some suggest that the criteria are imprecise, for example criterion B does not specify what constitutes appropriate medical reassurance (Starcevic, 2001). Others consider that differential diagnosis requiring exclusion of medical illness, is problematic and leads to under diagnosis, especially among older populations who are more likely to have multiple physical health problems (Wijeratne & Hickie, 2001). Anxiety about health may be due to existing illness or be part of other psychiatric disorders, but still cause great distress (e.g., Fava, Fabbri, Sirri, & Wise, 2006;

Noyes, Happel, & Yagla, 1999). There has been an influential school of thought that has seen hypochondriasis as a form of depression, especially in older people (e.g., Kenyon, 1964). An ongoing debate is whether hypochondriasis and health anxiety should be considered categorical or dimensional (Asmundson, Taylor, Carleton, Weeks, & Hadjstavropoulos, 2012; Ferguson, 2009; Salkovskis & Warwick, 1986).

DSM-IV -TR (APA, 2000) categorises hypochondriasis under the Somatoform Disorders. Some writers have suggested that in future editions of DSM the somatoform disorders should be reformulated as "Psychological factors affecting medical condition" (Fava et al., 2006; Sirri, Fabbri, Fava, & Sonino, 2007). This new category would include the somatoform disorders and other manifestations of health anxiety. Others propose that hypochondriasis should be included in the anxiety disorder classification, because of the strong phenomenological similarities between hypochondriasis and many anxiety disorders (Collimore et al., 2009; Noyes, 1999). The scope of this review limits detailed analysis of these contentious issues. Nonetheless, the concept of "health anxiety" has potential to address some of these debates and mitigate the negative connotations associated with a diagnosis of hypochondriasis alluded to earlier.

In what have been described as "landmark" publications (Rachman, 2001), Salkovskis and Warwick (1986; Warwick & Salkovskis, 1990) proposed the expression of *health anxiety* as a more comprehensive description than hypochondriasis. The description suggested by these authors acknowledges similarities to anxiety disorders and is more inclusive of anxiety about health occurring in conjunction with other conditions such as depression and anxiety.

Health anxiety

A careful definition of health anxiety has potential to reduce the unacceptability of a diagnosis of hypochondriasis and to acknowledge that categorical diagnostic criteria for hypochondriasis may exclude individuals with significant debilitating health worries. In addition, this definition would recognise that worry and anxiety about health occur in other clinical disorders and exist on a continuum from the adaptive to maladaptive. There are several descriptions of *health anxiety* in the literature and it is important at the outset to clarify the definition used throughout this thesis.

In some instances, health anxiety is a synonym for hypochondriasis (Rachman, 2001; Salkovskis & Warwick, 1986). Anxiety about health is often an individual's normal

and adaptive response to changes in health status and in this context, health anxiety is interchangeable with illness worry. From this perspective, health anxiety describes an unspecified level of concern about illness or poor health, which diminishes when the individual seeks appropriate medical advice and care (Asmundson, Taylor, Sevgur, & Cox, 2001). Other authors have suggested a diagnostic category of health anxiety to explain subsyndromal or abridged hypochondriasis (Fava & Mangelli, 2001). In this case, health anxiety is non-specific abnormal illness behaviour that becomes disproportionate to the level of threat, but in contrast to hypochondriasis, responds to medical reassurance.

In the clinical literature, the term health anxiety commonly describes a continuum of behaviours and cognitions from mild concern about bodily symptoms through to obsessive thoughts about, and preoccupation with, illness (Lucock & Morley, 1996; Salkovskis & Warwick, 1986; Warwick & Salkovskis, 1990). Alternatively, health anxiety depicts a spectrum of disorder that encompasses unwarranted anxiety about health and disease phobia through to hypochondriasis and somatic delusions (Collimore et al., 2009; Noyes et al., 2008; Taylor & Asmundson, 2004). Both of these latter characterisations echo the definition given by Savage (1892) noted earlier.

Somatisation is another term commonly encountered in the literature that is often synonymous with hypochondriasis and this is briefly explained below.

Somatisation

In the literature, "somatisation" describes a form of abnormal illness behaviour in which the person experiences multiple medically unexplained symptoms (Kirmayer & Looper, 2006; Woolfolk & Allen, 2007). As noted previously, the history of somatisation is entwined with hysteria and hypochondriasis and can be traced to Egyptian and Grecian writings (Berrios, 2001; Woolfolk & Allen 2007). Current understandings of the psychopathology of somatisation arise from the work of Briquet (Woolfolk & Allen, 2007). Comparable to hypochondriasis, there is substantial controversy about the diagnosis of somatisation disorder. Contemporary nosologies differentiate hypochondriasis and somatisation. Distress in somatisation is due to the symptoms themselves, whereas in hypochondriasis is due to interpretations of the symptoms. It is acknowledged however, that they can co-occur and that health anxiety may be a common feature of both disorders (Woolfolk & Allen, 2007). Somatisation is also a feature of depression, anxiety and functional somatic syndromes such as irritable bowel syndrome and chronic fatigue. While a detailed review is precluded, discussion in the following chapters draws on some of the

substantial literature on somatisation and somatic syndromes where this literature intersects with, or provides clarity to, aspects of health anxiety.

Definitions

Hypochondriasis is poorly defined in the literature with different terms being used to describe similar phenomena. There is often for example, little clarity whether "hypochondriasis" refers to diagnosed disorder or a spectrum of distress. When discussing the research literature, terminology used in this thesis generally reflects that used in the original reports. Below is a glossary of terminology found in the literature review and the definition of health anxiety adopted for the present study.

Somatoform disorders	the overarching DSM-IV-TR diagnostic category describing mental disorders characterised by bodily signs and symptoms
Hypochondriasis	severe and clinically significant health anxiety with symptoms reaching, or approximating to, diagnostic criteria
Health anxiety	a continuum of somatic distress, which may include hypochondriasis
Subsyndromal hypochondriasis	symptoms of hypochondriasis not sufficient for a diagnosis of hypochondriasis
Abridged hypochondriasis	*see* subsyndromal hypochondriasis
Illness worry	undefined worries about illness, often a synonym for health anxiety
Somatisation	physical symptoms without organic explanation
Medically unexplained symptoms	*see* somatisation
Functional somatic syndromes	somatic syndromes focussed on specific symptom clusters e.g. irritable bowel, fibromyalgia, chronic fatigue.

The definition of health anxiety adopted for the current study is that proposed within the cognitive behavioural paradigm. This definition explains health anxiety as a

continuum from mild concern about symptoms and health to a preoccupation with illness that has significant effects on an individual's well being, which may occur with other disorders and/or medical illness. Severe health anxiety may warrant a diagnosis of hypochondriasis (Lucock & Morley, 1996; Salkovskis & Warwick, 1986; Warwick & Salkovskis, 1990).

Epidemiology

Epidemiology of a disorder shows the course, progression and societal impact of a syndrome (Asmundson et al., 2001). Accurate information from population surveys depends on the ways in which mental disorders are operationalised and measured. As noted in the previous section, health anxiety does not have a universally accepted definition. Consequently, there is no accurate data in the prevalence of health anxiety per se, there are however, studies of related constructs; hypochondriasis, illness worry and somatisation. This section first discusses the prevalence of hypochondriasis in the general population then examines the influence of different diagnostic criteria and likely prevalence of health anxiety. After this, the prevalence literature pertinent to older adults is examined. To provide background for the later discussion of older adults, this section concludes with an overview of health anxiety in other conditions and the consequences of health anxiety in the general population.

Hypochondriasis

It is usual for somatoform disorders to be either included as a single category or (more commonly) excluded altogether in community surveys. *Te Rau Hinengaro: The New Zealand Mental Health Survey* (Oakley Brown, Wells & Scott, 2006) for example, did not include any of the somatoform disorders in the survey. A probable reason for this is that operationalisation of the concept of hypochondriasis is somewhat problematic (Noyes, 2001, 2004). Noyes noted that current nosologies of hypochondriasis carry a number of exclusion rules that require that other mental disorders such as anxiety or depression take priority and that acute health worries are not explained by medical conditions. These criteria are particularly difficult to comply with in population surveys, as they imply that researchers should access medical opinion or records to verify diagnosis, which may not be achievable in practice. Additionally, these exclusions may lead to underestimation of prevalence, especially in older adults (Sheehan & Banerjee, 1999). Older participants often experience multiple medical problems and take medication with side effects that mimic anxiety (Wijeratne et al., 2003). These factors lead to practical difficulties in determining the difference between medically explained and unexplained symptoms, leading in turn to

exclusion from diagnosis even though they may experience significant health anxiety (Wijeratne, et al., 2003).

A second difficulty in comparing data from population surveys of hypochondriasis is variability in methodology. Some surveys use self-report measures, others use semi-structured interviews conducted by trained lay interviewers or medically trained personnel. There is also variability in the types of population surveyed in that participants are recruited from; psychiatric clinics, outpatients, primary care settings or the general community. These conditions have resulted in highly variable estimates of prevalence for hypochondriasis and other somatoform disorders.

When patients in psychiatric and medical settings are surveyed, the prevalence of hypochondriasis is unsurprisingly quite high. For example, in a sample of 76 randomly chosen medical outpatients, 6 month prevalence of hypochondriasis was 4.2% -6.3% (Barsky, Wyshak, Klerman, & Latham, 1990). Another study of 183 patients presenting with medically unexplained symptoms in an outpatient clinic, found point prevalence of hypochondriasis as high as 19% (Speckens, VanHemert, Spinhoven, & Bolk, 1996).

Patients with high health anxiety often present first in primary care and studies are often carried out in this context (Kirmayer & Looper, 2001). Creed and Barsky (2004) made an extensive review of studies in primary care and the community. These authors reported seven studies in primary care with a range of prevalence of hypochondriasis from 0.8% to 6.3%. A World Health Organisation (WHO) study across 14 countries using International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10, WHO, 1993) criteria, found hypochondriasis to be "surprisingly uncommon" at a prevalence of 0.8% (Gureje et al., 1997). This study was methodologically rigorous as it included screening by physicians for psychological and physical health using the WHO Composite International Diagnostic Interview (CIDI) and ICD-10 criteria.

Of more relevance to the present study, are prevalence studies carried out among community populations. The review by Creed and Barsky (2004), found only four studies that measured hypochondriasis in the general population. These studies showed highly variable rates of hypochondriasis in the community, with prevalence ranging from 0.02% to 7.7%. Two more recent studies conducted in Germany, and using DSM-IV criteria, found very low prevalence of hypochondriasis at 0.4% (Bleichhardt & Hiller, 2007) and 0.05% (A. Martin & Jacobi, 2006).

The most methodologically significant community study to date was carried out by Faravelli and colleagues (1997) in Florence, Italy. In this research, a representative population was selected and diagnosis of somatoform disorders carried out using medical records by general practitioners (GP) with psychiatric training. When there were disagreements or clarification was required, the GP interviewed the individual. Out of the 673 respondents, 136 (20 %) met criteria for DSM-III somatoform disorders. Researchers reported one-year prevalence of hypochondriasis as 4.5% and somatisation disorder as 0.7%.

Health anxiety

As noted previously, prevalence estimates are influenced by diagnostic criteria. The complications posed by the exclusionary rules of various diagnostic nosologies were illustrated by Bach, Nutzinger and Hartl (1996) when they examined the effects of the hierarchical rules in three diagnostic systems (DSM-III, DSM-III-R and ICD-10). Similar to DSM-IV (APA, 2000), DSM-III (American Psychiatric Association, 1980) criteria excluded a diagnosis of hypochondriasis if the condition was due to any other mental disorder; DSM-III-R (American Psychiatric Association, 1987) and ICD-10 (WHO, 1993) did not have this hierarchical rule. In the study population of 82 psychiatric patients, over 50% of the participants qualified for a diagnosis of hypochondriasis under DSM-III-R or ICD-10 criteria. In sharp contrast, only 14.6% qualified under DSM-III criteria. The differences in rates of diagnosis were largely due to individuals excluded because of the presence of an anxiety disorder. The limitations of diagnostic criteria were further illustrated by an Italian study of primary care patients which reported prevalence of subsyndromal somatoform disorders at 65.9%, although prevalence of hypochondriasis was only 1.6% (Altamura, Carta, Tacchini, Musazzi, & Pioli, 1998). Studies focussed on hypochondriasis found similar results. The WHO study in primary care found that if the criteria “refusal to accept medical reassurance” was dropped, prevalence of this “abridged hypochondriasis” was 2.2%, compared with 0.8% for full diagnosis (Gureje, et al., 1997).

Recent studies with medical and primary care patients have confirmed that measuring significant health anxiety instead of hypochondrias per se greatly increases estimates of occurrence. To illustrate, a British study of 28,991 general hospital patients attending cardiology, respiratory, neurological, endocrine and gastrointestinal clinics at six hospitals, found 19-25% of these patients reported significant health anxiety (Tyrer et al., 2011). In primary care, an Australian study found that 18.5% of the 10,507 patients surveyed met study criteria as “somatisers” which was defined as a combination of high

somatic symptom scores together with high levels of hypochondriacal ideation (Clarke, Piterman, Byrne, & Austin, 2008).

Community surveys designed to investigate the prevalence of illness worry or similar constructs also find a marked increase in the percentage of the population affected. Occurrence of illness worry has been found to range from a prevalence of 6.2% (Looper & Kirmayer, 2001) to 13.1% (Noyes, Carney, Hillis, Jones, & Langbehn, 2005). Comparing these figures with the extremely low percentages of participants meeting full criteria for hypochondriasis noted previously, this represents a potentially large burden of under diagnosed and untreated distress in the community.

Hypochondriasis and Health Anxiety in Older Adults

There appear to be few studies that specifically target hypochondriasis and health anxiety among older populations. Most of the epidemiological studies reported previously have been cross-sectional, therefore although some studies reported that illness worry increases with age (e.g., Bleichhardt & Hiller, 2007; Rief, Hessel, & Braehler, 2001), this has not been confirmed by longitudinal studies (Snyder & Stanley, 2001). In contrast, a review of studies of somatisation (which included hypochondriasis) between 1965 and 1999 found that there was no increase in somatisation with age, (Sheehan & Banerjee, 1999), but the authors noted that this conclusion could only be tentative because of the deficiencies in methodology and diagnosis noted earlier. Notably, a more recent review came to similar conclusions (Schneider & Heuft, 2011).

Two population studies have measured the prevalence of hypochondriasis among older adults, using the Geriatric Mental State Interview (GMS, Copeland et al., 1976). The first was carried out among adults 65 and over in Zaragoza, Spain and Liverpool, England. Hypochondriasis was found to be "rare" in both locations and occur at 1.1% and 1.8% respectively (Saz, Copeland, Camara, Lobo, & Dewey, 1995). A more recent study carried out in the United Arab Emirates, found a prevalence of 4.4% in an older population average age 68.6 years (Ghubach, El-Rufaie, Zoubeidi, Al-Shboul, & Sabri, 2004). These prevalence rates are however, likely to be underestimates because of restrictive criteria for a diagnosis of hypochondriasis in the GMS hierarchy (Sheehan & Banerjee, 1999).

As was found for younger adults, it seems that at the level of 'diagnosis,' prevalence is low, however at a 'syndrome' or symptom level, the likely prevalence is much higher. The Berlin Aging Study (a multidisciplinary study of adults aged 70-100 living in the

community) showed that DSM-III hypochondriasis was “not found”, however “typical symptoms were seen in every second participant” (Schaub & Linden, 2000, p. 54). Similarly, a Spanish study of primary care patients aged between 66 and 101 years reported “hypochondriacal ideas” in 7.2% of participants (Olivera et al., 2008).

In summary, limited epidemiological evidence indicates that, similar to younger adults, hypochondriasis in older adulthood has low prevalence. Diagnostic criteria that do not allow for the particular conditions of aging such as increased likelihood of physical illness, likely mean that these are underestimates. When diagnostic criteria are relaxed, health anxiety appears to increase with age and is highly prevalent.

Health Anxiety in Other Conditions

Some of these differences in prevalence noted previously, may be due to health anxiety that occurs as part of other conditions that are specifically excluded from the diagnosis of hypochondriasis, such as other somatoform disorders, medical conditions, anxiety and mood disorders.

Health anxiety is a feature of somatoform disorders, chronic pain and functional somatic syndromes. There is considerable overlap between somatic syndromes and hypochondriasis, and while comorbid diagnosis is rare, hypochondriasis with somatic symptoms or hypochondriacal beliefs in somatic syndromes is not (Creed & Barsky, 2004; Woolfolk & Allen, 2007). Irritable bowel syndrome for example, is related to abnormal illness behaviour and hypochondriacal ideas (Gomborone, Dewsnap, Libby, & Farthing, 1995). There is limited research in the relationships between pain and health anxiety. Chronic pain is associated with abnormal illness behaviour (Pilowsky & Spence, 1976) and high levels of health anxiety (Rode, Salkovskis, Dowd, & Hanna, 2006), but equally, may not be related to severity of health anxiety (H. Hadjistavropoulos, Owens, Hadjistavropoulos, & Asmundson, 2001).

It is acknowledged that health anxiety may occur as part of physical illness (Taylor & Asmundson, 2004). In the general population mental distress and chronic illness are frequently comorbid (e.g., Teesson et al., 2011) and epidemiological studies have consistently shown that illness worry is elevated in those with medical conditions (Bleichhardt & Hiller, 2007; Gureje et al., 1997; Looper & Kirmayer, 2001; Noyes et al., 2005). Notably, Looper and Kirmayer (2001) and Noyes and colleagues (2005) reported that half of the participants reporting illness worry, also reported a medical condition.

Studies have found associations between elevated health anxiety and specific conditions that occur more frequently with increasing age, such as cancer (H. Hadjistavropoulos et al., 2012; Noyes et al., 2005), multiple sclerosis (Kehler & Hadjistavropoulos, 2009) and cardiac disease (Ratcliffe, MacLeod, & Sensky, 2006). More important, comorbid health anxiety and physical illness contributes to higher levels of impairment than physical illness alone (Looper & Kirmayer, 2001; Noyes et al., 2005).

Health anxiety, somatisation and hypochondriasis are features of depression and anxiety (Noyes, 2001). Early studies concluded that hypochondriacal concerns were not usually separate from depression (Kenyon, 1964) and that health anxiety and somatic complaints were features of "masked" depression (Lesse, 1983). More recent reviews by Noyes (2001) and Leib and colleagues (2007) concluded that hypochondriasis is frequently comorbid with depression but more commonly comorbid with anxiety disorders.

Anxiety about health is frequently a feature of anxiety disorders such as panic, generalised anxiety disorder (GAD), obsessive compulsive disorder (OCD) and specific phobia (Noyes, 1999, 2001). Panic disorder and hypochondriasis have similar phenomenology and are commonly comorbid (Bach et al., 1996; Barsky, Barnett, & Cleary, 1994). Barsky and colleagues (1994) for example, estimated that 25% of panic patients in their study exhibited symptoms of health anxiety. Worry is a cardinal feature of GAD and worries about health are a frequent feature, especially with increased age (Montorio, Nuevo, Marquez, Izal, & Losada, 2003; Sing, Yee Ling, & Adley, 2011). Obsessions and compulsions about health are also seen regularly in OCD (Noyes, 1999).

All of the above conditions represent health anxiety in the general population that is unrecognised within current nosologies. These factors are particularly salient to older adults and are discussed further in Chapter 4.

Demographic Risk Factors

Health anxiety, hypochondriasis and somatisation occur across cultures, but manifest in culturally specific ways (Gureje et al., 1997; Kirmayer & Young, 1998). The relationship between health anxiety and other demographic factors is not clear (Barsky, Wyshak, Klerman, et al., 1990; Creed & Barsky, 2004). While somatisation is associated with female gender, low education and income, non-white race and young age (Noyes, 2001), Creed and Barsky (2004) noted no systematic relationship with any demographic indicators in hypochondriasis. Community studies have reported female gender and low

education have small but significant associations with health anxiety (Bleichhardt & Hiller, 2007; Clarke et al., 2008; Looper & Kirmayer, 2001), whereas, gender was not associated with hypochondriasis or subsyndromal hypochondriasis in the WHO study (Gureje et al., 1997). Although, as noted above, medical illness may contribute to health anxiety, others have found no correlation between medical morbidity and a diagnosis of hypochondriasis (Barsky, Wyshak, Latham, & Klerman, 1991). Evidence for an association between age and health anxiety is equivocal. While age and hypochondriasis have negligible correlations (Barsky, Frank, Cleary, Wyshak, & Klerman, 1991; Creed & Barsky, 2004), some epidemiological studies indicate an increase in health anxiety with age (e.g., Bleichhardt & Hiller, 2007; Rief et al., 2001).

Consequences of Health Anxiety

Health anxiety may be chronic and have debilitating consequences. A recent longitudinal study of Danish primary care patients found that even after controlling for physical illness, health anxiety persisted across the two years of the study and predicted unfavourable outcomes, such as high physician visits and health care costs (Fink, Ornbol, & Christensen, 2010). This is consistent with earlier cross-sectional studies that show that health anxiety is persistent and health anxious and somatising individuals incur twice the health care costs of others (Barsky, Cleary, Sarnie, & Klerman, 1993; Barsky, Ettner, Horsky, & Bates, 2001; Barsky, Orav, & Bates, 2005). Health anxiety is associated with poor outcomes such as high levels of disability, distress and medical utilisation (Bleichhardt & Hiller, 2007; Looper & Kirmayer, 2001). Other negative outcomes include increased levels of work disability and death in cardiac disease (Hlatky et al., 1986; Kubzansky et al., 1997). Gureje and colleagues (1997) found hypochondriasis adversely affected subjective health, disability, and health care utilisation, and these effects persisted regardless of diagnostic criteria. Similarly, studies of illness worry found negative effects on function and health status, independent of physical illness (Bleichhardt & Hiller, 2007; Looper & Kirmayer, 2001; A. Martin & Jacobi, 2006; Noyes et al., 2005).

Chapter Summary

This chapter has provided the background context for the current study by positioning the concept of health anxiety in within the long history of hypochondriasis. The historical review has shown that since the 19th century, explanations of hypochondriasis have included the concepts of attention to and perception of bodily processes and anxiety about health. These conceptualisations are reflected in current understandings of hypochondriasis. Since formalisation of diagnostic criteria in the 1960s, there have been

ongoing disagreements about the limitations of diagnostic criteria. The review outlined some of these current controversies, which led to introduction of the concept of health anxiety.

The review of epidemiological research in the general population shows that measuring the prevalence of hypochondriasis is fraught with difficulty. There is however, a consensus that hypochondriasis, as defined by current nosologies, has low prevalence across age groups. More important for the present study, there is an appreciable increase in prevalence when diagnostic criteria are relaxed and/or health anxiety or illness worry is the focus of study. What is not in doubt is that health anxiety has costly personal and societal consequences. When considering older adults, the available epidemiological evidence is sparse, but indications are that health anxiety increases with age. This increase, combined with the negative consequences of health anxiety, signal that health anxiety has the potential to be a significant barrier to individual health and well-being. The issue of health anxiety in older adults is addressed further in Chapter Four.

As noted earlier, hypochondriasis has long intrigued the psychiatric and psychological communities and this has given rise to a plethora of theoretical explanations for these conditions. Important contributions to this debate follow.

CHAPTER 3 - THEORETICAL EXPLANATIONS OF HYPOCHONDRIASIS AND HEALTH ANXIETY

"The mind is so its own place, and in itself
Can make Heaven or Hell"
Paradise Lost. Milton

Hypochondriasis and health anxiety lie at the nexus of the disciplines of psychiatry, health psychology and clinical psychology. Accordingly, theoretical explanations are found in the literature of these disciplines. This review first briefly introduces the concept of "illness behaviour" then addresses explanations found in the health psychology and clinical psychology and psychiatric literature, with particular focus on cognitive theories. The final section briefly examines empirical support for cognitive explanations of health anxiety, with particular emphasis on body perception variables.

Illness Behaviour

When a person experiences ill health, behaviours occur on a continuum from denial, through adaptive help seeking, to excessive concern about well being. Building on the work of Parsons (1951) social conceptualisation of the "sick role", Mechanic and Volkart (1961) proposed the construct of "illness behaviour" to describe the perception and evaluation of symptoms of ill health and the consequent behaviour. There are many influences on this behaviour including medical, psychological, demographic, social and economic factors, all of which have been the subject of extensive literature. Although a detailed discussion of these issues is beyond the scope of this thesis (the interested reader is referred to Young (2004) for a comprehensive review), the notion of illness behaviour has proved a useful foundation in conceptualisations of health anxiety.

Models from Health Psychology

The discipline of Health Psychology examines the broad topic of health and illness behaviour. The health psychology literature is a useful starting point in this discussion as extensive work has been carried out into cognitive and perceptual influences on symptom awareness (see Cioffi, 1991 for review). This thesis will briefly examine three cognitive models from health psychology; the "Health Beliefs Model" (Becker & Maiman, 1975; Rosenstock, 1966), the "symptom perception" model (Pennebaker, 1982; Watson & Pennebaker, 1989) and the "common sense model" (Leventhal, Leventhal, & Contrada, 1998).

Health beliefs model

The relationship between attitudes, beliefs and behaviour has been extensively studied in social and health psychology and models have been developed to explain health behaviour (Lyons & Chamberlain, 2006). Rosenstock (1965) first proposed the "Health Beliefs Model" to explain protective health behaviours, specifically, to study influences on compliance or non-compliance with medical recommendations. Although this theoretical formulation was initially focussed on health behaviour or disease prevention, Rosenstock (1965) suggested that the model might have utility in explaining illness behaviour. This model hypothesised that behaviour is a function of perceptions (i.e. beliefs) about seriousness and susceptibility to illness and efficacy of care. A later review by Becker and Maiman (1975) suggested that in addition to these health beliefs other psychological factors should be included in the model, including financial and other costs of action, doctor patient relationship and social influences. From this work a revised health beliefs model was developed that has been used extensively in health psychology (Lyons & Chamberlain, 2006). This model, explains health anxiety as exaggeration of the appraisals of severity, threat and susceptibility to illness thereby leading to increased likelihood of seeking help to alleviate concerns.

Symptom perception model

Symptom perception is adaptive and protective, as without it the individual would not take action to care for themselves in the face of possible ill health (Lyons & Chamberlain, 2006). Symptom perception is influenced by individual stable and transient factors together with social influences (Lyons & Chamberlain, 2006). Stable factors include personality traits such as negative affect/neuroticism that are related to symptom perception independent of objective health status (Costa & McCrea, 1985; Watson & Pennebaker, 1989). Transient factors that affect symptom perception are mood, attention, expectations, cognition, and stress (Lyons & Chamberlain, 2006). Extensive studies on the psychology of symptoms concluded that selective attention to bodily states increase symptom awareness, but not accuracy of interpretation (Pennebaker, 1982; Pennebaker & Skelton, 1978, 1981). Additionally, cognitive and perceptual processes were crucial in symptom recognition and experience (Pennebaker, 1982). Social factors such as gender, age, education, social class and culture also influence the experience and reporting of symptoms; for example women report more symptoms than men (Lyons & Chamberlain, 2006). Age is an important determinant of illness behaviour, with older adults more likely

,to attribute symptoms to old age rather than physical illness (Prohaska, Keller, Leventhal, & Leventhal, 1987).

Symptom perception is thus a function of attention and cognitive appraisals, which in turn influence symptom reporting. This symptom perception model explains health anxiety as over-perception or hypervigilance to bodily states that has a reciprocal relationship with the trait of negative affectivity. In turn, this hypervigilance leads to a cycle of over reporting of symptoms and further hypervigilance to symptoms culminating in identification of the individual as "hypochondriac" (Pennebaker, 1982; Watson & Pennebaker, 1989).

Common sense model

The common sense model of illness behaviour explains symptom perception as part of self regulatory behaviour (Leventhal et al., 1998). The individual develops a common sense or naive theory of the meaning of symptoms and signs of illness, and these beliefs and associated emotions determine behaviour (R. Martin, Lemos, & Leventhal, 2001). In addition to the variables associated with symptom perception, behaviour is influenced by cognitive representations or tacit rules about illness. These frequently useful heuristics, sometimes lead to under or over reporting and inappropriate health seeking behaviour. More important for the present study, the common sense model is a cognitive model of illness behaviour (Leventhal, Leventhal, & Breland, 2011) and has been used to explain health anxiety/hypochondriasis. In this model, health anxiety likely arises from faulty heuristics about the meaning of symptoms, (e.g. the "pathology rule" i.e. any and all symptoms mean disease). These misperceptions lead to judgement errors, health anxiety and thence problematic behaviours, such as frequent help-seeking and resistance to reassurance (Leventhal, Diefenbach, & Leventhal, 1992; R. Martin et al., 2001). In this framework, examining and replacing these faulty rules with more accurate representations would lead to alleviation of health anxiety (Leventhal et al., 1992; R. Martin et al., 2001).

Although the health belief, symptom perception and common sense models explain illness behaviour in cognitive terms, and have utility in explaining health and illness behaviour that is outside the norm, they are not specific to health anxiety. The discussion now addresses theories and models of hypochondriasis and health anxiety from the clinical literature. First, psychodynamic and interpersonal explanations are briefly discussed, then the influential work of Pilowsky is examined. The final sections explain the cognitive behavioural models that form the theoretical background for the current research.

Models from Clinical Psychology and Psychiatry

Psychodynamic explanations

An examination of theoretical models of health anxiety would be incomplete without acknowledging work of Freud, and his profound influence on the understanding of human behaviour (Lipsitt, 2001). Freud's primary interest was the study of hysteria and left explanation of the "enigma" of hypochondriasis to others (Lipsitt, 2001). Inevitably, however, psychodynamic explanations of hypochondriasis draw on his work to explain the connectivity between mind, body and social circumstances that results in the "perplexing illness" of hypochondriasis (Lipsitt, 2001).

Psychoanalytic theory assumes that difficulties experienced by the individual during childhood shape identity formation (Lipsitt, 2001). As Lipsitt discusses, in psychoanalytic terms, hypochondriasis is due to, inadequate parenting, deprivation or separation, leading to repression of ambivalence towards the parent, thence guilt that may be expressed as bodily complaints. The repression of guilt in this way also reduces negative affect, which leaves the hypochondriacal person unwilling to relinquish their symptoms.

Although the current study focuses on cognitive explanations of health anxiety, psychodynamic formulations of hypochondriasis were among the first to provide an intra-psychic explanation of behaviour. Additionally, psychoanalytic and psychodynamic explanations highlight "self-absorption in the body" as a prominent feature of hypochondriasis (Lipsitt, 2001, p. 187), which is a core feature of cognitive explanations. Freud's concept of the effects of disruptions in childhood leading to later mental distress also underpins many contemporary models of health anxiety.

Interpersonal theory

Applying attachment theories (Bowlby, 1973) to somatisation and hypochondriasis, Stuart and Noyes (1999) proposed an interpersonal model of somatisation and hypochondriasis (Noyes et al., 2003). These researchers suggested disrupted early attachment leads to ineffective personal relationships and difficulties expressing emotion. The individual then compensates for this by obtaining emotional support from others through their health anxieties. Persistent reassurance seeking however, leads to disruptions in relationships that paradoxically exacerbate their care-seeking behaviour. This maladaptive care seeking results in a spiral of dysfunctional interpersonal relationships that reinforce and maintain health anxieties.

This interpersonal model has been integrated with cognitive conceptualisations (e.g., Longley, Watson, & Noyes, 2005), which includes cognitive, affective, behavioural (interpersonal) and perceptual features of health anxiety. Recent findings however, indicate that cognitive and affective features may be more salient to health anxiety than interpersonal factors (Fergus & Valentiner, 2011).

Abnormal illness behaviour

Pilowsky (1969), drawing on the concept of illness behaviour (Mechanic & Volkart, 1961), introduced the term "abnormal illness behaviour" to provide a comprehensive explanation of somatisation, hypochondria and hysteria. Pilowsky described abnormal illness behaviour as

> ...an inappropriate or maladaptive mode of experiencing, evaluating or acting in relation to one's own state of health, which persists despite the fact that a doctor (or other recognised social agent) has offered accurate and reasonably lucid information concerning the person's health status and the appropriate course of management (if any), with provision of adequate opportunity for discussion, clarification and negotiation, based on a thorough examination of all parameters of functioning (physical, psychological and social) taking into account the individual's age educational and socio-cultural background (Pilowsky, 1997, p. 25).

Pilowsky's (1967, 1969, 1997) explanation of hypochondriasis was based on four phenomenological criteria; uncomfortable awareness of bodily events most of the time, health fears, resistance to reassurance from doctors, and failure to recognize that psychosocial factors may be relevant to the condition. Pilowsky proposed that sensitivity to bodily 'noise' was likely a biological predisposition exacerbated by childhood experience. Affect and context together with beliefs about bodily functions were important mediators of the awareness and perceptions of the dangerousness of bodily noise. Pilowsky also acknowledged the influences of psychodynamic factors and social forces in the genesis of hypochondriasis.

Using clinical observations, Pilowsky (1967) proposed three dimensions of hypochondriasis; bodily preoccupation, disease phobia and disease conviction accompanied by resistance to doctor reassurance. From this work Pilowsky developed the Whitley Index (WI, Pilowsky, 1967) as a self-report measure of hypochondriasis.

Pilowsky's conceptualisation of hypochondriasis is highly influential and continues to shape current research and clinical practice. The WI for example, is frequently used in clinical practice and the validity of the disease phobia and disease conviction components of hypochondriasis are the subject of ongoing investigations (e.g. Fergus & Valentiner, 2010). More important for the current study, Pilowsky explained the range of abnormal illness behaviour as a disorder of bodily perception, which is a central precept of current cognitive explanations.

Pilowsky's explanation was also an early example of a biopsychosocial theory of illness later espoused in the psychiatric literature by Engel (1977). Biopsychosocial explanations were adopted by psychology as a useful heuristic to explain the interaction of biological, psychological and social factors that lead to psychopathology (see Gilbert, 1995). More recently, Abramowitz and Braddock (2008) have updated Pilowsky's framework for understanding health anxiety and hypochondriasis. These authors not only incorporate the assumptions of the cognitive behavioural model, but also include constructs from the anxiety literature such as anxiety sensitivity, intolerance of uncertainty and body vigilance to explain the onset and maintenance of health anxiety.

As noted in the explanations from health psychology, cognition has an important role in the explanation of health anxiety and hypochondriasis. The discussion now moves on to cognitive explanations of hypochondriasis and health anxiety from the clinical literature.

Amplification hypothesis

The amplification model proposes that hypochondriasis is a disorder of amplification of bodily cues (Barsky, 2001; Barsky, Goodson, Lane, & Cleary, 1988; Barsky & Klerman, 1983) where an individual experiences harmless bodily sensations as "intense, noxious and disturbing" (Barsky et al., 1988, p. 510). Barsky and colleagues (1988) suggested that somatosensory amplification had three components; a tendency to focus attention on bodily sensations, selective attention to infrequently occurring sensations and cognitive and affective reactions that intensify the sensations thereby making them more disturbing. Some consider amplification as hypervigilance to and the exaggeration of somatic cues and largely a perceptual bias (e.g., Barsky, 2001; Mehling et al., 2009). Others however, suggest that it is a cognitive process i.e. the individual believes that they are somatically sensitive (Bernini, Berrocal, Ciaramella, Poli, & Guazzelli, 2008). This latter suggestion has received some empirical support with research measuring event-related

potentials suggesting that somatosensory amplification may be a cognitive process rather than due to physiological awareness (Nakao, Barsky, Nishikitani, Yano, & Murata, 2007).

Longitudinal research found that amplification remained relatively stable over four years and concluded amplification was a trait-like characteristic that denoted a vulnerability to hypochondriasis (Barsky, Fama, Bailey, & Ahern, 1998). Other research suggests that it is unrelated to age (Barsky, Frank, et al., 1991; Jung, Lee, Park, & Oh, 2003). A tendency to somatosensory amplification is characteristic of not only hypochondriasis but also a wide range of somatic difficulties including somatoform disorders and functional somatic syndromes (Barsky, 2001). This cognitive explanation emphasises the perception, amplification and interpretation of bodily sensations as the primary cause of somatic distress and a lesser emphasis is given to contextual and interpersonal factors. Some writers assert that empirical support for this hypothesis as a 'stand alone' explanation of health anxiety is unconvincing (Avia, 1999; Duddu, Isaac, & Chaturvedi, 2006). More persuasively, other writers (e.g., Marcus et al., 2007; Williams, 2004) incorporate somatic amplification into the cognitive behavioural model of health anxiety.

Cognitive behavioural model

The cognitive behavioural model of health anxiety was developed by Paul Salkovskis and colleagues (Salkovskis, 1996; Salkovskis & Warwick, 1986; Warwick & Salkovskis, 1990) and was derived from the cognitive theories of Aaron Beck (1976). This section first briefly explains Beck's theory of depression and anxiety then provides a detailed exposition of the cognitive theory of health anxiety.

Cognitive theory assumes that thinking plays a key role in the aetiology of mental distress and from this basis, Aaron Beck (1976) developed his cognitive model of depression. Beck's cognitive theory states that emotion arises from the appraisal and interpretation of an event and this appraisal and interpretation is dependent on the context of and emotional response to an event. The complex interaction of these factors then drives behaviour. Beck's formulation of mental distress has been very influential and has been extended to explain many disorders including; mood disorders (Beck, Rush, Shaw, & Emery, 1979), anxiety disorders (Beck, Emery, & Greenberg, 1985), medically unexplained symptoms (R. J. Brown, 2004), somatisation (Woolfolk & Allen, 2007) and health anxiety (Salkovskis, 1996; Salkovskis & Warwick, 1986).

In the cognitive behavioural paradigm, anxious appraisal of new and uncertain events is an adaptive response to the possibility of threat. For some individuals however, the threat is exaggerated and the individual perceives greater risk than objective assessment would imply (Beck et al., 1985). Beck proposed that if these faulty appraisals become habitual, then anxiety could rise to debilitating levels. In this formulation, anxiety is a continuum in which the level of anxiety depends on the perceptions of the "awfulness" of the event and the individual's perception of their ability to cope. This has been illustrated as:

$$\text{Anxiety} = \frac{\text{probability x awfulness}}{\text{Coping + rescue}}$$

(from Salkovskis, 1996)

Paul Salkovskis and Hilary Warwick (Salkovskis, 1996; Salkovskis & Warwick, 1986; Warwick & Salkovskis, 1990) proposed that hypochondriasis is an extreme manifestation of anxiety about health and extended the general formulation of anxiety to health anxiety and hypochondriasis. This conceptualisation arose from two sources; first the phenomenological similarities between anxiety disorders and hypochondriasis and second that the diagnostic criteria for hypochondriasis rest on fear of disease.

The cognitive model of health anxiety hypothesises that innocuous symptoms and stimuli are (mis)interpreted as illness or a serious health threat (Salkovskis, 1996; Salkovskis & Warwick, 1986; Salkovskis & Warwick, 2001a; Warwick & Salkovskis, 1990). These misinterpretations arise from predisposing factors such as biology and/or prior experience leading to dysfunctional assumptions about health and illness (*cf.* common sense model). A stressful event ('critical incident') then triggers these prior assumptions leading to anxious appraisals of the threat and health anxiety. This then sets up an interacting cycle of response that serves to maintain health anxiety. If for example, an individual becomes anxious about an aspect of their health or notices a new bodily sensation or sign, this causes them to become more vigilant to body sensations and imperfections, triggering beliefs about the dangerousness of the symptoms. This in turn increases their attention to the bodily sensation and leads to a perpetuating cycle of increasing health anxiety. To alleviate this anxiety, the individual then engages in behaviours such as bodily checking and reassurance seeking which then serve to reinforce and perpetuate the cycle. The increased attention to the bodily sensations then leads to physiological arousal, which exacerbates

the symptom leading to further misinterpretation of the symptom as illness and greater anxiety. This process is illustrated in Figure 1.

The cognitive behavioural model provides a more comprehensive explanation of health anxiety than those described earlier. Similar to Pilowsky's (1967) explanation, this is a biopsychosocial model integrating biological and developmental perspective in the formation of dysfunctional beliefs. Emphasis is placed on the cognitive/perceptual aspects of health anxiety in the explanation of the wider physiological, affective and behavioural consequences of health anxiety.

Empirical research has shown that aversive childhood experiences result in later health anxiety (e.g. Noyes, Stuart, Langbehn, et al., 2002). Other research has demonstrated the relationship between behaviour and health anxiety in both young and older adults (e.g. Abramowitz, Deacon, & Valentiner, 2007; Boston & Merrick, 2010). A common factor in a majority of the models described in the previous section is the importance of the cognitive functions such as appraisal of, and beliefs about symptoms. These core features form the basis of this thesis. The next section will examine the literature relevant to the specific cognitive processes of beliefs and attention and their relevance to health anxiety.

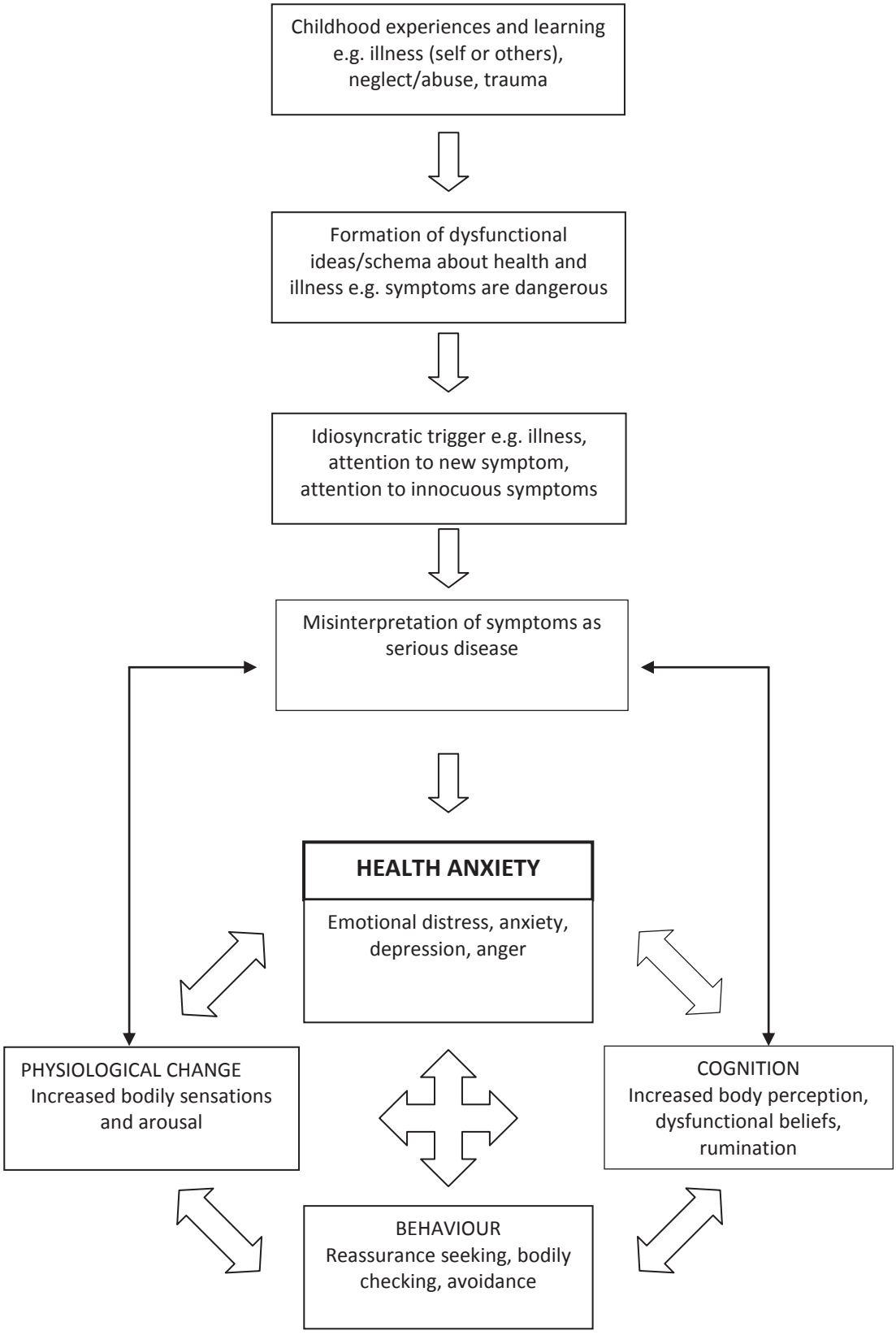

Figure 1: Cognitive behavioural model of health anxiety - adapted from Warwick and Salkovskis (1990)

Empirical Support for Cognitive Factors in the Model

Cognition is a critical feature of explanatory models of health behaviour, illness beliefs and health anxiety described earlier. Central cognitions in the cognitive behavioural model of health anxiety are disturbances in the perceptions of bodily changes. Specifically, these are dysfunctional beliefs and assumptions about illness, attention to and misinterpretation of bodily sensations and negative cognitions about illness (Salkovskis, 1996; Salkovskis & Warwick, 1986; Salkovskis & Warwick, 2001b).

Beliefs

Beliefs about health and illness are fundamental to cognitive models of health and illness behaviour described earlier A review and meta-analysis concluded that there is consistent evidence that those with high levels of health anxiety have dysfunctional beliefs about health and illness (Marcus et al., 2007).

Hypochondriacal patients have a limited concept of health and believe that good health is symptom free (Barsky, Coeytaux, Sarnie, & Cleary, 1993; Rief, Hiller, & Margraf, 1998). Further, research with non-clinical student cohorts showed those reporting high health anxiety were more likely to interpret ambiguous symptoms as indicative of serious disease (Marcus, 1999; Marcus & Church, 2003), and were more likely to interpret bodily sensations in a catastrophic manner (Hitchcock & Mathews, 1992).

Patients diagnosed with hypochondriasis are more likely than non-patients to have greater sense of vulnerability to health threats, but not other dangers such as being a victim of crime (Barsky, Ahern, et al., 2001). It also appears that these estimates of risk decrease with increasing medical morbidity (Barsky, Ahern, et al., 2001). In a recent study, for example, Hadjistavropoulos and colleagues (2012) suggested that cognitions and beliefs differ between individuals experiencing health anxiety with or without a medical illness diagnosis. Death anxiety is considered by some to be a central feature of health anxiety (Noyes, Stuart, Longley, Langbehn, & Happel, 2002) and people with health anxiety hold negative and superstitious beliefs about death (James & Wells, 2002).

Attention

Attention is an important cognitive process in the explanation of symptom interpretation (Cioffi, 1991; Pennebaker, 1982). Bias in the attention paid to threatening information in the environment is regarded as an crucial factor in the aetiology and maintenance of anxiety (Beck, 1976). Extensive experimental testing of this proposition has

been conducted in anxious and non-anxious populations. A meta-analysis concluded that regardless of the experimental procedures or population, this "threat related bias is a robust phenomenon in anxious individuals and does not exist in nonanxious individuals" (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van Ijendoorn, 2007, p. 15). From this, cognitive theories of health anxiety hypothesised that individuals with high health anxiety selectively attend to illness related information (Warwick & Salkovskis, 1990).

Experimental studies have shown attentional bias for health related words in high health anxiety (Karademas, Christopoulou, Dimostheni, & Pavlu, 2008; Owens, Asmundson, Hadjistavropoulos, & Owens, 2004), however others have not replicated these findings (Karademas et al., 2008; Lees, Mogg, & Bradley, 2005). Some have found this effect only when illness concerns were activated (Lecci & Cohen, 2002) and that selective attention in high health anxiety was transient (Witthoft, Rist, & Bailer, 2008).

Information processing biases may affect interpretation of health related information. Bias for health related words was found in students with high levels of somatoform symptoms (A. Martin, Buech, Schwenk, & Rief, 2007) and individuals with chronic fatigue syndrome (Hou, Moss-Morris, Bradley, Peveler, & Mogg, 2008). Conversely, a study that included hypochondriasis patients showed only moderate support for this hypothesis (H. D. Brown, Kosslyn, Delamater, Fama, & Barsky, 1999). Other studies concluded that health-word recognition is associated with health anxiety and the extent of negative emotion associated with the word (Ferguson, Moghaddam, & Bibby, 2007).

Interoception. A particular form of attention, interoception, or physiological awareness of the body, is significant in anxiety (Domschke, Stevens, Pfleiderer, & Gerlach, 2010; Mehling et al., 2009). A narrative review by Domschke and colleagues (2010) found that better interoception was associated with high anxiety, implying that interoception or body awareness would be important in individuals with high levels of health anxiety.

Experimental evidence using heart rate detection and sensitivity to hot and cold is however, equivocal. Hypochondriacal individuals were less accurate in the detection of resting heartbeat than non-hypochondriacal individuals (Barsky, Brener, Coeytaux, & Cleary, 1995; Mailloux & Brener, 2002; Steptoe & Noll, 1997). Another study measuring tactile sensitivity to non-painful stimuli, similarly found no significant differences between those high and low in somatosensory amplification (Haenen, Schmidt, Schoenmakers, & vandenHout, 1997; Pauli, Schwenzer, Brody, Rau, & Birbaumer, 1993). Conversely, other

studies using pain sensitivity as a measure, found that participants with high health anxiety scores were more sensitive to cold and pain (Gramling, Clawson, & McDonald, 1996; H. Hadjistavropoulos, Craig, & Hadjistavropoulos, 1998) and had a low pain threshold (Pauli et al., 1993). These discrepant findings might be explained by heterogeneity of the research paradigms, the use of non-clinical populations and inadequacies in the measures used (Marcus et al., 2007).

In summary, empirical evidence supports the place of dysfunctional beliefs in health anxiety. Although there is strong and consistent support for threat related bias and interoception in anxiety, the small number and heterogeneity of studies provide only tentative experimental support for attentional biases in health anxiety. Alternative research using self-report measures has investigated the role of specific cognitive constructs in the explanation of health anxiety.

Body Perception

Current literature has focussed on the role of specific cognitive constructs in the understanding of health anxiety. Cognitive conceptualisations of health anxiety emphasise the similarity to anxiety disorders (Collimore et al., 2009; Noyes, 1999; Salkovskis & Warwick, 1986), and anxiety related constructs may have utility in explaining health anxiety (Abramowitz & Braddock, 2008). Two specific constructs from the anxiety literature, anxiety sensitivity and body vigilance, have been of particular interest and are discussed. Amplification of sensations is also a salient feature of cognitive understandings of health anxiety (Barsky, 2001; Marcus et al., 2007) and the specific construct of somatosensory amplification is also discussed. Following prior work (e.g. Fergus & Valentiner 2010), the constructs of anxiety sensitivity, body vigilance and somatosensory amplification will be referred to as "body perception" constructs throughout the remainder of this thesis.

Anxiety Sensitivity

The concept of anxiety sensitivity developed from the "expectancy model of fear" (McNally & Reiss 1985 cited in Reiss 1991) and is a cognitive bias or belief that anxiety symptoms are dangerous, sometimes referred to as "fear of fear" (McNally, 1999; Reiss, 1991). Anxiety sensitivity is a heritable individual difference in response to fear that is associated with, but not analogous to, trait anxiety (Olatunji & Wolitzky-Taylor, 2009; Reiss, 1991; Stein, Jang, & Livesley, 1999). Prospective and longitudinal studies have shown that anxiety sensitivity predicts anxiety symptoms in adolescents and young adults (Schmidt et al., 2010; Schmidt, Lerew, & Jackson, 1997). Longitudinal evidence showing that high

anxiety sensitivity predicted panic disorder three years later, further substantiates these findings (Maller & Reiss, 1992). A comprehensive review and meta-analysis showed anxiety sensitivity is strongly related to not only panic, but also other anxiety disorders (Olatunji & Wolitzky-Taylor, 2009).

Anxiety sensitivity consists of three dimensions; social, cognitive and physical concerns (Taylor et al., 2007; Zinbarg, Mohlman, & Hong, 1999). Olatunji and Wolitzky-Taylor (2009) proposed a model of anxiety sensitivity that places anxiety sensitivity as a lower order factor of negative affect and trait anxiety. These authors suggested that the three dimensions of anxiety sensitivity represented particular risk factors for specific anxiety disorders. Evidence presented by Olatunji and Wolitzky-Taylor (2009), concluded that panic was associated with the physical concerns dimension, social anxiety with social concerns and, although the evidence was less clear, generalised anxiety to the cognitive concerns dimension. Phenomenological overlap between panic and health anxiety, implies that anxiety sensitivity may have utility in explaining health anxiety. It may be for example, that health anxiety mediates the relationship between anxiety sensitivity and panic (Berrocal, Moreno, & Cano, 2007).

It is likely that a catastrophic understanding of somatic cues is learned in childhood. A retrospective study obtained self reports of symptoms, childhood history of, and parental response to, illness from a group of undergraduate students, and where possible, these reports were verified by parent reports (Watt & Stewart, 2000). This study found that anxiety sensitivity was a common vulnerability in both health anxiety and panic, in addition, anxiety sensitivity was a mediating factor in the development of health anxiety (Watt & Stewart, 2000). An earlier study established positive correlations between self assessed anxiety sensitivity and health anxiety in panic patients (Otto, Pollack, Sachs, & Rosenbaum, 1992). These findings were extensively criticised because of possible confounding between health anxiety and anxiety sensitivity, due in part to content overlap between measures (see Cox, Borger, & Enns, 1999; McClure & Lilienfeld, 2001 for discussion). To counter these arguments, Otto and colleagues (1998) replicated their study with a group of patients with major depression and no history of panic and found that anxiety sensitivity continued to be the strongest predictor of health anxiety.

In further studies, two groups of college students with high and low anxiety sensitivity completed self-report measures of anxiety sensitivity and health anxiety together with diagnostic interviews for anxiety and somatoform disorders (Cox et al., 1999;

Cox, Fuentes, Borger, & Taylor, 2001). These authors concluded that, participants with high anxiety sensitivity scores were more likely to have high scores on the somatoform disorder screen, and suggested that anxiety sensitivity might be fear of bodily sensations rather than fear of fear (Cox et al., 2001).

Critically, research that is more recent, measured health anxiety using self-report instruments with less content overlap with anxiety sensitivity measures. These studies have shown consistent associations between health anxiety and anxiety sensitivity in clinical (Deacon & Abramowitz, 2006, 2008) and non-clinical student populations (Olatunji et al., 2009; S. H. Stewart, Sherry, Watt, Grant, & Hadjistavropoulos, 2008; Wheaton, Berman, & Abramowitz, 2010; Wheaton, Berman, Franklin, & Abramowitz, 2010; Wheaton, Deacon, McGrath, & Berman, 2012). Moreover, anxiety sensitivity was a significant predictor of health anxiety (Wheaton, Berman, & Abramowitz, 2010).

As noted previously, anxiety sensitivity has physical, cognitive and social dimensions and it would be expected that the physical concerns dimension would be associated with health anxiety. Self-report studies confirm that the physical dimension of anxiety sensitivity but not the social or cognitive dimensions predict health anxiety (S. H. Stewart et al., 2008; Wheaton, Berman, & Abramowitz, 2010; Wheaton et al., 2012). Experimental work also lends weight to this hypothesis, with participants scoring high in anxiety sensitivity being more likely to have an attentional bias to health threat cues (Lees et al., 2005). Further, participants high in physical anxiety sensitivity exhibited selective attention towards physical threat words in dot probe tests (C. Hunt, Keogh, & French, 2006; Keogh, Dillon, Georgiou, & Hunt, 2001).

From this evidence, anxiety sensitivity is a very useful construct in the explanation of beliefs in health anxiety. Anxiety sensitivity in older people is discussed in Chapter 4. As described earlier, attention to or monitoring of internal states, is central to cognitive explanations of health anxiety, an exploration of this literature follows.

Body Vigilance

In a review of body awareness, Mehling and colleagues (2009) hypothesised that body awareness had four probable dimensions; attention to body sensations, perceived body sensations, attitude to body sensations and emotional awareness of physical sensations. The dimensions of most interest here is attention to sensations. Internal monitoring of physical sensations has been variously described in the literature as; private

body consciousness (Miller, Murphy, & Buss, 1981) and body vigilance (D. M. Clark et al., 1997; Schmidt, Lerew, & Trakowski, 1997).

Internally focussed attention is associated with increased reports of symptoms and somatisation (Bernstein, Zvolensky, Sandin, Chorot, & Stickle, 2008; Pennebaker, 1982). Body consciousness is also associated with functional somatic syndromes such as chronic fatigue (e.g., van der Werf, de Vree, van der Meer, & Bleijenberg, 2002) and pain (e.g., Rode, Salkovskis, & Jack, 2001).

Body vigilance or conscious attention to bodily cues, predicts panic symptom severity and is elevated in generalised anxiety disorder (GAD) and hypochondriasis patients (Olatunji, Deacon, Abramowitz, & Valentiner, 2007). Body vigilance is strongly correlated with anxiety sensitivity in both clinical and non-clinical samples (Olatunji et al., 2007; Schmidt, Lerew, & Trakowski, 1997) and especially with the physical concerns dimension of anxiety sensitivity (Zvolensky & Forsyth, 2002). There is limited research into the importance of body vigilance in health anxiety.

A few studies have reported associations between body vigilance and health anxiety for both clinical (Abramowitz, Olatunji, & Deacon, 2007; Deacon & Abramowitz, 2008) and student populations (Olatunji et al., 2007; Wheaton, Berman, Franklin, et al., 2010). Wheaton and colleagues (2010) conducted a study with a large cohort of undergraduate students (N = 636) within a cognitive behavioural framework. The participants completed measures of anxiety sensitivity, health anxiety and body vigilance. As expected, the health anxiety measure correlated strongest with the body vigilance and the physical concerns scale of the anxiety sensitivity measure. Additionally, body vigilance and anxiety sensitivity were significant predictors of health anxiety, replicating results reported in a study conducted with anxiety disorder and hypochondriasis patients (Abramowitz, Olatunji, et al., 2007). This implies that body vigilance and anxiety sensitivity measures capture internal monitoring of and beliefs about, bodily sensations proposed in the cognitive behavioural model. The body vigilance scale used in both studies however, contains a list of autonomic symptoms that could be part of medical illness. The study by Wheaton and colleagues (2010) assumed that surveying a non-clinical student cohort would be sufficient control for significant medical morbidity, which may have weakened their conclusions.

Interestingly, some authors have suggested that these associations might be underestimates because the measure of body vigilance was originally designed to assess arousal related panic symptoms and not non-arousal symptoms that might be important in health anxiety (Deacon & Abramowitz, 2008). This intriguing possibility is addressed further in Chapter 5.

The discussion now moves to an associated construct, somatosensory amplification, that is another body perception variable that forms the central precept of the amplification model (Barsky, Wyshak, & Klerman, 1990) and is sometimes included in the cognitive model (e.g., Marcus et al., 2007; Williams, 2004).

Somatosensory Amplification

The amplification hypothesis combines the notions of attention to, amplification of and appraisal of bodily sensations (Barsky et al., 1988). Amplification theory is a cognitive theory but emphasises amplification of minor symptoms in both the genesis and maintenance of health anxiety and hypochondriasis. Somatic amplification was first operationalised as somatosensory amplification, and combined attention, amplification and cognitive appraisals of body sensations (Barsky et al., 1988; Barsky & Wyshak, 1990; Barsky, Wyshak, & Klerman, 1990). Amplification is usually measured using the somatosensory amplification scale (SSAS) developed by Barsky, Wyshak and Klerman (1990). Somatic amplification is associated with hypochondriasis (Barsky et al., 1988; Barsky & Wyshak, 1990; Barsky, Wyshak, & Klerman, 1990), somatic symptoms (Aronson, Barrett, & Quigley, 2001; Spinhoven & van der Does, 1997) and disease phobia (Fergus & Valentiner, 2010). Meta analysis showed high effect sizes for these relationships (Marcus et al., 2007). There has been criticism of the measure as it may not be sensitive or specific to somatic symptoms (Duddu et al., 2006), or be a measure of other features of somatisation such as cognition or negative emotionality (Aronson et al., 2001; Bernini et al., 2008; Nakao et al., 2007). The literature search found no studies that explored amplification within an explicit cognitive behavioural framework.

In conclusion, high amplification is associated with high health anxiety; however, there is disagreement as to the nature of somatosensory amplification and its relationship to hypochondriasis and other disorders. Some believe that it is not a reliable indicator of health anxiety but is more likely to be a measure of a cognitive trait rather than an increased sensitivity to internal bodily cues. This will be discussed further in Chapter 5.

Chapter Summary

This chapter provided a comprehensive summary of current explanations of health anxiety. Finding a definitive explanation of the aetiology of hypochondriasis and health anxiety has proved elusive and has lead to many competing theories. Each model gives selective emphasis to an aspect of behaviour or cognition. The role of early childhood experience and interpersonal behaviours is given prominence in psychodynamic and interpersonal formulations of health anxiety. Cognitive theories, such as the cognitive behavioural model proposed by Salkovskis (1996), emphasise the interaction of (hyper)vigilance to bodily sensations and beliefs about such sensations in the aetiology and maintenance of health anxiety.

Experimental research provides some support for the notion that health anxious people hold particular and often mistaken beliefs about health and illness and may pay more attention to internal sensations. The review next examined specific cognitive/perceptual constructs that have been investigated in the health anxiety literature. The research in the general population shows that constructs of anxiety sensitivity and body vigilance, from the anxiety literature, have utility in explaining health anxiety. Additionally, amplification of somatic cues, operationalised as somatosensory amplification, is associated with health anxiety. These constructs may also explain health anxiety in older adults, and this literature is explored in the next chapter.

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CHAPTER 4 - OLDER ADULTS

"Elderly people are considered by many to be egocentric and preoccupied by bodily functions, often to the extent of hypochondriasis."

Hart (1990, p. 247)

This chapter commences with a selective and brief review of the psychology of aging, which includes theories of aging and the effects of age on the expression of emotion. Epidemiological evidence presented Chapter 2 suggests that health anxiety may be a greater problem for older adults than younger cohorts; the following discussion provides an assessment of likely vulnerability to health anxiety among older adults. The chapter then considers the cognitive model with relation to older adults and concludes with an examination of the body perception constructs of interest in the current research.

Theories of Aging

Contemporary explanations of the aging process include theories from biology, sociology and psychology. This discussion focuses exclusively on theories from psychology and specifically the influential theories of Paul Baltes (1990), Laura Carstensen (1995), Becca Levy (2003), Ken Laidlaw (2003) and Bob Knight (2008).

There are two broad conceptualisations of aging theory in psychology, age-irrelevant theory and age-change theories (Belsky, 1999). The theories of health anxiety described in the previous chapter are age-irrelevant theories that do not account for the effects of age related change in an individual's response to stress. Psychoanalytic and interpersonal theory for example assumes that behaviour in older age is predicated on personality traits that developed from childhood experience. Similarly, traditional behavioural and cognitive theory assumes that behaviour is malleable, affected by environmental circumstances and largely unaffected by the aging process. In contrast, age-change theories assume that mental health is determined by the individual's ability to adjust to age related change. Prominent in the field is Paul Baltes, whose work in the Berlin Aging Study (BASE) informed his integrated theories of the aging process.

Paul Baltes' (Baltes & Baltes, 1990) theory of Selective Optimisation with Compensation (SOC) proposed three interacting mechanisms that assist the individual to adapt to age related change. These are; selection of personally relevant functions, optimisation, or engaging in behaviour that enriches life, and then compensation for age

related losses by using prior experience and other strategies such as cognitive and technological aids. Baltes' later work provided contextual, multidimensional and multidirectional approach which integrated both age irrelevant and age relevant change. Baltes used the example of the classical pianist Artur Rubenstein to illustrate his theory. Despite physical decline, Rubenstein continued to give public performances into his 8th decade. He achieved this by selection and reduction of his repertoire. He optimised his performance by practising these fewer pieces more often. His ability to play quickly had also declined and he compensated for this by selectively adjusting the tempo of the piece to give the illusion of speed. Expanding the theory into the emotional sphere, an individual becomes more expert at regulating their emotions and optimising well-being even when facing stressful situations.

Carstensen (1995) expanded Baltes' theory to explain social relationships and emotion. Carstensen's socio-emotional selectivity theory proposed that there are shifting life goals over the life span, with emotionally relevant relationships becoming more important with age because of increased awareness of a limited future. A recent longitudinal study exploring this theoretical paradigm found that there was an improvement of emotional well being with age, emotional experience stabilised with age and older people experienced a greater mixture of positive and negative emotion (Carstensen et al., 2011). This increase in positive emotion with age has been demonstrated in several studies and increased negative affect is likely associated with ill health not age per se (see Scheibe & Carstensen, 2010 for review).

Another perspective is provided by Becca Levy's (2003) work on the influence of internalised stereotypes about aging on various aspects of the aging process. Levy's (2003) review delineated the development of negative and positive self-stereotypes of aging. Positive aging stereotypes were associated with more protective health behaviours (Levy & Myers, 2004). Equally, there was a strong association between negative stereotypes and poor; memory, functional health, cardiovascular response to stress and mortality (Levy, 2003; Levy et al., 2008). An experimental study has shown that when both negative mood and negative aging stereotypes are activated, then older adults are more attentive to physical symptoms (Poon & Knight, 2009) implying a relationship between aging stereotypes and health anxiety.

In the clinical literature, Knight and Poon (2008) and Laidlaw and colleagues (2003) proposed two similar pan-theoretical approaches that incorporated life span theory, cohort

factors and gerontology to explain late life psychopathology and inform treatment. Knight's (2008) Contextual Adult Lifespan Theory for Adapting Psychotherapy (CALTAP) and Laidlaw's (2003) Comprehensive Conceptualisation Framework (CCF) were developed to provide an integrated framework for psychological interventions for older adults. Both models consider the positive and negative aspects of aging together with cohort specific characteristics. The CALTAP and CCF models suggest that cohort, culture and context interact with individual characteristics and age related challenges to influence the presentation of distress (Knight & Laidlaw, 2009; Knight & Poon, 2008).

Older age is a time of potential social, physiological and psychological change. Social change includes retirement, loss of friends and life-partners and frequently, multiple changes in living situation. There is an increased focus on the physical in older age, with change encompassing the trivial such as greying hair, to life threatening illness and cognitive decline (Knight & Poon, 2008). Each birth cohort (defined as a group of individuals born within a seven to ten year age span) has experienced specific socio-historical events that influence psychological coping with change (Knight & Poon, 2008).

CALTAP and CCF models also incorporate other concepts such as the influence of negative aging stereotypes (Levy, 2003) in explanations of distress in older adults. Within the CALTAP framework, health anxiety could be explained as negative aging stereotypes producing dysfunctional beliefs that, when activated by age related physical decline, lead to emotional distress (Knight & Laidlaw, 2009).

Aging and Distress

Much psychological research carries the unspoken assumption that the manifestation and experience of psychological distress is unchanged across the life span. This assumption is now disputed, as clinical and empirical evidence indicates that the experience of distress may change in both qualitative and quantitative ways with age (Bryant, 2010; Wolitzky-Taylor et al., 2010). Although epidemiological studies consistently show a reduction in depression and anxiety with older age (e.g., Jorm, 2000), some argue that this is an artefact of measurement and diagnosis that does not recognise the differences in the expression of distress in older adults (Bryant, 2010). To illustrate; depression in older adults is often associated with increased reports of somatic symptoms (Kramer-Ginsberg, Greenwald, & Brod-Miller, 1989; Wittenborn & Buhler, 1979), and may present as "depression without sadness", characterised by apathy and loss of interest rather than low mood (Blazer, 2003).

Similarly, anxiety disorders may manifest differently in older adults. The content of fearful thoughts change with age (Bryant, 2010; Kogan & Edelstein, 2004). Kogan and Edelstein developed a fear questionnaire relevant to older adults and found that age relevant fears such as "mental decline, poor well-being of loved ones, inability to care for oneself, diminished health, and being robbed or attacked" (p. 400) were most common among older adults.

Cognitive symptoms of anxiety may be more prominent in older adults. GAD and subsyndromal GAD are common in older adults (Wolitzky-Taylor et al., 2010), and worries in GAD in older age, are more likely to be focussed on health (S. Hunt, Wisocki, & Roger, 2009; Wisocki, 1988). In an unpublished study, Roberts (2010) found that cognitive symptoms were more prominent than somatic symptoms as markers of anxiety in older adults. This corresponds with other evidence indicating that, when compared with younger people, cognitive factors are more prominent in panic symptomology among older adults (Depp, Woodruff-Borden, Meeks, Gretarsdottir, & DeKryger, 2005). Older adults also appear to favour cognitive coping strategies to reduce anxiety. Hunt, Wisocki and Yanko (2003) found that older adults used cognitive strategies, such as thinking positively, to cope with worry, whereas their younger counterparts were more likely to engage in behavioural and affective strategies. This then suggests that cognition may be an important feature of health anxiety in older adults.

Health Anxiety and Older Adults

In 2001 Snyder and Stanley observed that there was minimal information about health anxiety in older adults. Epidemiological evidence presented in Chapter 2 implied that health anxiety might increase with age. There is, however, limited empirical evidence suggesting that older adults experience less health anxiety than younger cohorts

An early study of hypochondriasis in general medical clinic patients, showed that hypochondriacal symptoms were unrelated to age even when physical illness was accounted for (Barsky, Frank, et al., 1991). Two recent studies of health anxiety in community-based adults have measured health anxiety using empirically validated health anxiety measures.

Bourgault-Fagnou and Hadjistavropoulos (2009) surveyed two groups, one over 65 and the other undergraduate students. The Illness Attitudes Scale (IAS, Kellner, 1987) was used to measure health anxiety and the older adults completed a measure of frailty, where

frailty, or burden of disease, was a composite measure of physical illness, functional abilities and subjective health. These researchers found that the older non-frail group had lowest health anxiety and concluded that elevated health anxiety was due to high frailty not age. Similarly, Boston and Merrick (2010) reported that in their community sample of older adults, health anxiety scores on the Short Health Anxiety Inventory (SHAI, Salkovskis, Rimes, Warwick, & Clark, 2002) were similar to those reported in studies with younger adults using the same measure. Although not epidemiological research, these studies provide an interesting counter-argument to stereotypes of the "hypochondriacal" older adult. These findings are supported by research suggesting that stability or reduction of negative affect with age, reduces vulnerability to health anxiety (e.g., Costa & McCrea, 1985).

This research is in contrast to suggestions that adults are more likely to be health anxious as they age. Barsky (1993) concluded that older adults are more vulnerable to health anxiety because of risk factors such as increasing medical morbidity, decline in physical function and social isolation together with health anxiety occurring as part of depression and anxiety. The following paragraphs examine these risk factors and their probable influence on health anxiety in older cohorts. The discussion starts with influences of objective and subjective health, symptom perception and then moves to evidence from the clinical literature and the theories of aging.

As noted in Chapter 2, health anxiety and physical illness are related (Taylor & Amundsen, 2004). A majority of adults over 65 experience at least one chronic disease[1] which then contributes to mental distress and somatisation (Hart, 1990; Snyder & Stanley, 2001). There are a number of factors in older age that may contribute to this. First, chronic disease is associated with depression and anxiety symptoms in older adults (El-Gabalawy, Mackenzie, Shooshtari, & Sareen, 2011; Penninx et al., 1996). In addition, self-assessed or subjective health declines with increasing age, chronic illness and disability (El-Gabalawy et al., 2011; Pinquart, 2001). Functional limitations and pain are also often part of chronic illness and in turn contribute to estimates of the seriousness of health problems, anxiety and poor subjective health (Feeney, 2004; Hickey, 2002; Hickey & Stilwell, 1992; Pinquart, 2001). Functional limitations and medical morbidity in turn predict health anxiety (Boston & Merrick, 2010; Bourgault Fagnou & Hadjistavropoulos, 2009).

[1] defined as a disease that is present for greater than six months (Ministry of Health, 2004)

Contextual factors also influence assessments of health (Barsky, 1983). Older adults are more likely to be socially isolated and lonely due to mortality of life partners and friends (Snyder & Stanley, 2001). Similar to international studies, loneliness in older adults in New Zealand is associated with lower physical and mental health and reduced subjective health (La Grow, Neville, Alpass, & Rodgers, 2012; Stephens, Alpass, & Towers, 2010). The combination of factors described above, together with the relationship between subjective health and health anxiety in younger adult populations (e.g. Barsky, Cleary, & Klerman, 1992) argues that these are important factors that contribute to increased vulnerability to health anxiety in older adults. Arguing for a lesser influence of physical health with age; subjective health measurements are unrelated to objective health and older adults often overestimate their health because they attribute their symptoms to age not illness (Pinquart, 2001; Prohaska et al., 1987).

The symptom perception model (Pennebaker, 1982; Watson & Pennebaker, 1989) provides another perspective. Symptom perception may assume greater importance with age, for example, there is evidence of increased symptom reporting with increasing age (Costa & McCrea, 1985). A longitudinal study of symptom reporting found self-reported frequency of bodily changes and the perceived seriousness of these changes was positively correlated with illness representations (Haug, Musil, Warner, & Morris, 1997, 1998). This further suggests an increased vulnerability to health anxiety with older age.

As noted previously, symptom perception is strongly related to neuroticism and negative affect (Costa & McCrea, 1985; Watson & Pennebaker, 1989). In their review of hypochondriasis and age, Costa and McCrea (1985) reported that in non-clinical populations, neuroticism is stable over lifetime and individual differences in symptom reporting have a stronger relationship to neuroticism than age. This then suggests that symptom perception and health anxiety are unrelated to age. Neuroticism and negative affect are associated with mental distress and the clinical literature provides another perspective on factors contributing to health anxiety in older age.

Health related anxiety is a common feature of anxiety and depression in older age (Wolitzky-Taylor et al., 2010). Subsyndromal anxiety is common in older adults, may affect up to 20% of community populations and is characterised by health related fears (Himmelfarb & Murrell, 1984). There is considerable evidence that worry content changes over the lifespan (Brenes, 2006; Diefenbach et al., 2003; S. Hunt, Wisocki, & Yanko, 2003; S. Hunt et al., 2009; Lindesay et al., 2006). Health worries increase with age and are a

consistent feature of anxiety disorders and subsyndromal anxiety among older adults (Diefenbach et al., 2003; Gonçalves, Pachana, & Byrne, 2011; S. Hunt et al., 2003; S. Hunt et al., 2009; Powers, Wisocki, & Whitbourne, 1992; Wisocki, 1988). Additionally, a longitudinal study following GAD patients for 40 years, found that GAD was "replaced" by undifferentiated somatoform disorders as the participants aged (Rubio & Lopez-Ibor, 2007). The consistent relationship between worry and health anxiety suggests an increased likelihood of health anxiety in older adults. These observations are tempered by almost universal findings that worry decreases with age (see S. Hunt et al., 2009 for review) which suggests lesser susceptibility and reduced influence of worry factors in health anxiety.

Although mood disorders are less prevalent than anxiety disorders in older adults (e.g., Oakley Browne et al., 2006) the association between somatisation, health anxiety and depression is well established, with depression in older adults often presenting as somatic and health anxious concerns (e.g., Monopoli, 2005). Providing further support for the influence of depression in health anxiety among older adults; health anxious symptoms were reported in 60% of depressed older adult inpatients (Kramer-Ginsberg et al., 1989). Other studies however, found that depression did not predict health anxiety in older adults (Bourgault Fagnou & Hadjistavropoulos, 2009).

A final perspective is given by the literature on theories of aging. Although the available literature does not address health anxiety directly, the generally optimistic view of older age suggests that in these conceptualisations of older age, older adults are less vulnerable to health anxiety. Socio-emotional selectivity theory (Carstensen, 1995) for example, would suggest that a bias towards positive affect would allow the older person to cope better with negative health information. Conversely, Levy (Levy, 2003; Levy & Myers, 2004) would argue that when aging stereotypes are internalised, these negative beliefs about aging act as triggers for mental distress.

In summary, the expression of distress changes with age, from the content of fear and worry to the increased emphasis on the physical rather than the emotional. Older adults experience a number of risk factors that may leave them more susceptible to health anxiety, however a small body of empirical evidence questions this. Current theories of aging emphasise that older adults become more adept at managing their emotional state to compensate for perceived and actual losses, meaning that older adults experience less emotional distress than their younger counterparts. These theories may be useful in explaining health anxiety in older adults, for example, the increasing focus on the physical

and activation of negative beliefs about aging may be part of the aetiology of health anxiety in older adults. Conversely, increased positive affect and effective emotional control strategies found in older age may compensate for losses leading to reduced health anxiety.

The Cognitive Model, Body Perception and Older Adults

In their review, Snyder and Stanley (2001) observed that there was no empirical data at that time to validate the applicability of the cognitive behavioural model of health anxiety to older adults. This situation is essentially unchanged, with few studies since that time directly addressing the utility of the cognitive model in the explanation of health anxiety in older adults.

One study published since 2001, suggests that the cognitive model of health anxiety may apply to older adults. This self–report study conducted with older adults within the cognitive behavioural paradigm was a cross-sectional survey of adults over 65 in New Zealand (Boston & Merrick, 2010). This study examined the relationship between health anxiety and safety behaviours. After controlling for demographic, physical health and disability factors, the authors reported that, consistent with the cognitive behavioural model, health anxiety uniquely predicted safety behaviours and medical utilisation.

There is also indirect evidence suggesting that cognitive explanations are salient to older adults. Older cohorts may have particular beliefs about health and illness. The common sense model for example, suggests that new symptoms may activate a "conservation rule" i.e. conserve energies and seek help quickly (R. Martin et al., 2001). Alternatively, an "age-illness rule" suggests that mild symptoms are more likely to be interpreted as due to aging rather than illness (Prohaska et al., 1987). Additionally, and as discussed in the previous section, negative beliefs about aging (Levy, 2003) affect the degree of attention to physical symptoms (Poon & Knight, 2009) and thence health anxiety. Finally, there is evidence that the cognitive aspects of anxiety assume greater importance in older age (e.g. Roberts, 2010), suggesting that cognitive aspects of health anxiety may assume greater relevance in older age.

As discussed in Chapter 3, the cognitive constructs of anxiety sensitivity, body vigilance and somatosensory amplification are relevant to cognitive theories and are of particular interest in this thesis. A discussion of the available literature in older adult populations follows.

Anxiety Sensitivity and Older Adults

Research into anxiety sensitivity in older populations is sparse. One study reported that anxiety sensitivity in older adults has a three dimensional structure and relationships to other anxiety measures similar to that found in research with younger cohorts (Mohlman & Zinbarg, 2000). Anxiety sensitivity scores are lower in older adults than younger groups (Deer & Calamari, 1998; Fuentes & Cox, 2000; Owens, Hadjistavropoulos, & Asmundson, 2000). Moreover, older adults who had prior experience of medical illness reported lower anxiety sensitivity scores that those with no history of illness (Bravo & Silverman, 2001). Conversely, high anxiety sensitivity was associated with poor adjustment to chronic illness (Norman & Lang, 2005). Of most interest, is the relationship between anxiety sensitivity, health anxiety and other disorders.

The review by Olatunji and Wolitzky-Taylor (2009) reported limited evidence regarding anxiety sensitivity, anxiety disorders and older adults. One study found that similarly to younger adults, anxiety sensitivity was a cognitive risk factor for panic symptomology in older adults (Deer & Calamari, 1998). Bravo and Silverman (2001) compared two groups of older adults (age range 60-92 years); one with diagnosed major depressive disorder and a matched non-depressed group. Anxiety sensitivity was elevated in depressed older adults when compared with the non-depressed sample. There was however, no relationship found between medical illness, anxiety sensitivity and trait anxiety. Further, in a study of anxiety among older adults (mean age 72.3 years), Frazier and Waid (1999) also found that medical illness was not correlated with anxiety sensitivity. These two studies found positive correlations between health anxiety and anxiety sensitivity (Bravo & Silverman, 2001; Frazier & Waid, 1999). Anxiety sensitivity predicted health anxiety and further, was a better predictor of health anxiety than depression or trait anxiety (Bravo & Silverman, 2001).

There are a number of concerns about the results reported by Bravo and Silverman (2001) and Frazier and Waid (1999). First, both studies used the Illness Attitudes Scale (Kellner, 1987) to measure health anxiety which, as noted in the previous discussion, has item overlap with the anxiety sensitivity measure. Furthermore, several items on the IAS assume the respondent is free of disease or measure behaviours that could occur in actual physical disease (e.g. *"if a pain lasts for a week or more, do you see a physician?")* rather than health anxiety per se. These measurement difficulties may have distorted the relationships between health anxiety and anxiety sensitivity. Second, regression analyses by Bravo and Silverman (2001) did not control for demographic and physical health factors

such as physical capability, pain or frailty in the relationships. Finally, neither study had a comparison group of younger adults to ascertain whether the relationships studied differed in any systematic way between older and younger adults.

In summary, research available to date suggests that anxiety sensitivity is a similar construct in old and young populations and older adults report lower scores than younger cohorts. Comparable to young adults, anxiety sensitivity predicts panic symptomology and health anxiety in older adults. However, possible measurement difficulties, exclusion of probable confounds and no direct comparisons with younger adults leave these conclusions open to debate.

Body Vigilance and Older Adults

Similar to anxiety sensitivity, studies of the construct of body vigilance in older adults are limited, and the literature search found no studies of relationships between body vigilance, health anxiety and older age. This section therefore reviews available literature on older adults and attention to bodily function, and draws on this wider literature to make inferences about body vigilance, older adults and health anxiety.

Two studies suggest differences in the degree of awareness of internal states between young and older adults with older adults self-reporting greater awareness of internal states (Montepare, 2006; Ross, Tait, Grossberg, & Handal, 1989), which may then lead to health anxiety.

The relationships between internal states and subjective health may also have relevance. A longitudinal study with a cohort of adults over 62 years old reported that after one year, body awareness (defined as attention to body sensations) was inversely correlated with self-assessed health but unrelated to physical health (Hansell & Mechanic, 1991). Further, body awareness was related to patient initiated medical visits (Hansell, Sherman, & Mechanic, 1991). There is substantial evidence that subjective health is a better predictor of mental health, health anxiety and medical utilisation than actual illness in older adults (e.g., Andrew & Dulin, 2007; Barsky et al., 1992; Frazier & Waid, 1999), leading to the possibility that body awareness and health anxiety are also related. Emotion and schema about aging are also possible factors in body awareness. A self-report study found that awareness of internal states increased with greater anxiety about aging (Montepare, 2006).

Considering the GAD literature; as noted earlier, GAD and subsyndromal GAD are among the most common mental health difficulties experienced in older age (Wolitzky-Taylor et al., 2010). Given the relationship between body vigilance and GAD (e.g., Olatunji et al., 2007) combined with that of GAD and increased health worries in older adults (S. Hunt et al., 2009) again leads to the inference that health anxiety may be related to increased body vigilance in older adults.

A qualitative review comparing psycho-physiological arousal and age was unable to draw any firm conclusions due to a paucity of literature (Lau, Edelstein, & Larkin, 2001). The authors did note however, that older adults appear to have lower physiological reactivity than younger adults; leading to the supposition that older adults are poorer at noticing physical symptoms. There is however, limited experimental evidence that older adults selectively attend to threat regardless of anxiety levels (Fox & Knight, 2005). Anxiety increases when faced with physical threat (Teachman & Gordon, 2009), especially age specific threats such as falling (L. A. Brown, White, Doan, & de Bruin, 2011). These findings, together with the association between attention to physical symptoms and negative beliefs about aging (Poon & Knight, 2009), suggests that age specific threat and beliefs increases anxiety and attention to physical symptoms.

In summary, although attention to bodily sensations is central to cognitive theories of health anxiety, there is surprisingly little direct research into this construct in older adult populations. Examination of the wider literature leads to the inference that attention to bodily sensations and health anxiety may be related in older adults, and that this relationship might be more important than in younger groups. The existing self-report and experimental evidence provides conflicting opinion about whether body awareness increases or decreases with age.

Somatosensory Amplification and Older Adults

Similar to the constructs of anxiety sensitivity and body vigilance, there is very limited empirical research into the amplification of physical sensations in older adult populations. There appear to be two studies in this area specific to older adults. Barsky and colleagues (1991) administered a measure of somatosensory amplification as part of their study of hypochondriasis and age. Participants were divided into those with and without hypochondriasis; these groups were further divided by age into those under and over 65 years. Examination of the scores for the hypochondriacal and comparison group showed amplification scores were elevated in the hypochondriasis groups, but there were

no significant differences between scores for participants under 65 and those over 65 in either condition. There were however limitations to this study, for example, the study had low power with small participant numbers in the hypochondriacal group (under 65, N = 38 and over 65, N=22). Additionally, only six hypochondriacal participants were over 75 years limiting inferences about amplification in older age groups.

A more recent Korean study also found that somatosensory amplification did not change with age (Jung et al., 2003). This study appears to be the only research to date that specifically targets the construct of somatosensory amplification in different age groups. The study investigated the relationship between somatosensory amplification and somatisation in two groups, 140 younger adults with mean age of 36 years (*SD*=8.3) and the other 33 older adults with mean age of 59 years (*SD*=7.0). These researchers reported no significant differences in amplification between the groups. The reported results should be viewed with caution because, although the full study details were not available, the older group was small and apparently did not include many participants over 65. Additionally, the mean age difference between groups was small. Finally, somatic symptoms and not health anxiety was the focus of study.

In summary, the highly limited information to date implies that amplification scores do not differ across age groups and are correlated with health anxiety. These conclusions are tentative however, because the age range of participants was very limited and did not appear to include many participants over 75 years.

Chapter Summary

Epidemiological evidence presented in Chapter 2 suggests that health anxiety increases with age, which corresponds with the increased risk factors, such as poor physical health, that older adults experience. This view is disputed by current theories of aging that suggest that older people adapt to the challenges of aging and experience less distress than might be expected. Notwithstanding this, evidence shows that older adults experience distress in qualitative and quantitative ways that differ from their younger counterparts. This further suggests that there may be differences between cohorts in the utility of explanatory models.

There is very limited empirical evidence that the cognitive model may be a useful explanatory model of health anxiety in older adults. Cognitive theories of health anxiety assume attention to and beliefs about physical sensations are fundamental features of

health anxiety, which may assume increased importance given the increased likelihood of physical problems with age. This combined with the emergence of cognitive expression of emotional distress suggests that cognitive constructs associated with perceptions of bodily sensations may be particularly salient for older adults. The constructs of anxiety sensitivity, body vigilance and somatosensory amplification have been the topic of increased research in the general population, but as this review has shown, are under researched in older cohorts. The available research in older adult cohorts also has a number of methodological limitations. Notably, measurement of health anxiety that may be inconsistent with the concerns of older adults and limited control of other factors that may contribute to health anxiety. Moreover, few extant studies have made direct comparisons with a younger cohort to discover whether there are any noteworthy differences between age groups. The principal aim of the current study was to address some of these shortcomings in the literature pertaining to older adults.

A particular difficulty in older adult research is the selection of appropriate psychometric measures. The next chapter addresses the measurement of the constructs of interest in the current study, i.e. anxiety sensitivity, body vigilance, somatosensory amplification and health anxiety.

CHAPTER 5 - MEASURING HEALTH ANXIETY AND BODY PERCEPTION

"The great secret that old people share is that you haven't really changed in 70 or 80 years. Your body changes, but you don't change at all."

Doris Lessing

This chapter focuses on issues of measurement of the core constructs in this thesis. There are few psychological measures validated for use with older adult cohorts (Wolitzky-Taylor et al., 2010), therefore an examination of the measures of the key constructs is included in the literature review. Each construct is considered in turn and a brief review of available measures and extant validity and reliability data is given. The discussion also considers the limitations of the body vigilance measure.

Anxiety Sensitivity

There are a number of anxiety sensitivity measures in current use. This review briefly discusses the older measures then focuses on the most recent measure, the Anxiety Sensitivity Index -3 (ASI-3, Taylor et al., 2007).

The first measure of anxiety sensitivity was the Anxiety Sensitivity Index (ASI, Peterson & Reiss, 1992), which was constructed as a single factor measure of overall anxiety sensitivity. The ASI has been used extensively in research and clinical settings and with a wide variety of populations. There was early disagreement about the factorial validity of the measure (see Zinbarg et al., 1999 for discussion) although some consensus was reached that there were likely three dimensions; physical concerns, mental incapacitation and social concerns. The ASI was reported to have similar factor structure in older and younger adult samples (Mohlman & Zinbarg, 2000).

Several attempts have been made to overcome the instability of the factor structure of the original ASI, for example the revised ASI (ASI-R, Taylor, 1998) and the anxiety sensitivity profile (ASP, Taylor & Cox, 1998). Although both improved on the original, they did not fully address the problems of the unstable factor structure and have not been used extensively (Olatunji & Wolitzky-Taylor, 2009; Taylor et al., 2007).

The most recent measure of anxiety sensitivity is the ASI-3 (Taylor et al., 2007), an 18 item measure specifically designed to measure the physical, cognitive and social dimensions of anxiety sensitivity. Development studies across seven samples in six countries found consistent factorial validity and good psychometric properties for the ASI-3.

Despite the relatively recent publication of this measure, several studies have confirmed the factor structure of the measure in clinical and non-clinical samples (Escocard, Fioravanti-Bastos, & Landeira-Fernandez, 2009; Osman et al., 2010; Wheaton et al., 2012). The ASI-3 factor structure has also been confirmed in Brazilian, German and Spanish samples (Escocard et al., 2009; Kemper, Ziegler, & Taylor, 2009; Sandin, Valiente, Chorot, & Santed, 2007). Recently published data of clinical anxiety patients from studies in Germany and the US, confirmed the construct, convergent and discriminant validity of the three factor measure (Kemper, Lutz, Bahr, Ruddel, & Hock, 2012; Wheaton et al., 2012). There appear to be no studies of the validity of the ASI-3 in older adult cohorts.

Body Vigilance

Of measures reviewed by Mehling and colleagues (2009), the Body Vigilance Scale (BVS, Schmidt, Lerew, & Trakowski, 1997) was considered a pure measure of attention to bodily cues and sensations. More important for the present study, this measure was developed from the panic literature and has been used in a number of recent health anxiety studies (e.g., Wheaton, Berman, Franklin, et al., 2010). The BVS has four items, three assess the degree of attention to bodily cues and the fourth assesses the attention paid to 15 sensations associated with panic symptomology. Development studies found that the measure had a single factor structure and moderate to good internal consistency in clinical, student and community populations (Schmidt, Lerew, & Trakowski, 1997).

A more recent study by Olatunji and colleagues (2007) confirmed the single factor structure in clinical and student samples. The BVS measure demonstrated good convergent and divergent validity and was strongly related to health anxiety and physical concerns of anxiety sensitivity and weakly associated with social anxiety for both samples (Olatunji et al., 2007). Among the patient group, BVS scores were highest in panic and hypochondriasis patients and were a unique predictor of panic symptom severity.

In contrast, a confirmatory factor analysis conducted across student samples in the US and Spain reported that a unidimensional model with a three item rather than four item measure gave best fit to the data (Bernstein et al., 2008). This study reported good internal consistency and convergent validity, however questioned the discriminant validity of the BVS measure as they found consistent associations with other measure of psychopathology such as depression. Although the factor structure and validity of the BVS appears similar across different populations, all populations studied had a mean age of 40 years and none included participants aged over 65.

The BVS has some limitations when measuring body vigilance in health anxiety. The BVS was developed for panic disorder and may not fully assess vigilance in health anxiety (Deacon & Abramowitz, 2008). BVS items concentrate solely on autonomic symptoms[2] found in panic, but health anxious individuals also pay attention to non-autonomic symptoms such as skin problems, fatigue, headache and joint pain (Salkovskis, 2001). Some authors propose that the difference between health anxiety and panic is that health anxious individuals pay attention to arousal non-reactive symptoms whereas individuals susceptible to panic are more attentive to arousal symptoms (e.g., Watt & Stewart, 2000; Watt, Stewart, & Cox, 1997). Walker and Furer (2008) found that approximately half their hypochondriasis patients were distressed by non-autonomic symptoms such as back pain, muscle soreness and headache as well as autonomic symptoms. Conversely, the study of the learning origins of anxiety sensitivity did not support this differential and found heightened sensitivity to all somatic sensations in highly health anxious individuals (Watt & Stewart, 2000). These inconsistencies and limitations might be addressed by modifications to the BVS.

Somatosensory Amplification

In order to test the somatosensory amplification hypothesis, Barsky and colleagues developed the somatosensory amplification scale (SSAS, Barsky, Wyshak, & Klerman, 1990). This scale comprises ten items that measure sensitivity to benign sensations such as sensitivity to hot and cold, hunger contractions, noise, air quality and internal sensations. The development studies found that the SSAS measure had good internal consistency, temporal stability and was correlated with hypochondriacal symptoms but not medical morbidity. These findings have been largely replicated in Hungarian (Koeteles, Szemerszky, Freyler, & Bardos, 2011), Japanese (Kumiko et al., 2002) and Turkish (Huseyin & Kemal, 2007) studies. The measure has been used in studies with older adults, but the validity of the measure was not reported (Barsky, Frank, et al., 1991; Jung et al., 2003).

There appear to be three studies of the factorial structure of the measure. Speckens and associates (1996) studied a Dutch translation of the scale across three groups, general medical patients (N = 115), GP patients (N = 107) and a sample from the general community (N = 185). Across these three samples, the SSAS had a single factor structure and explained a moderate to low level of variance in each population (25% in GP

[2] functions of the nervous system not under voluntary control, e.g. the regulation of heartbeat

patients, 30% in general population and 35% in medical outpatients). Chronbach's alpha ranged from .64 (GP patients) to .77 (medical outpatients).

A small Spanish study of hypochondriasis and panic patients (N = 17 in each group) reported a two factor structure (Martinez, Belloch, & Botella, 1999). These results should be viewed with caution however, due to the small sample and consequent low power of the analysis. A larger study in Italy with 246 chronic pain patients reported a single factor structure for SSAS (Bernini et al., 2008). There do not appear to be any studies of the factorial structure of the SSAS measure in English speaking community samples and none in adults over 65.

There is evidence questioning the validity of the measure. A comprehensive review reported that while the measure has acceptable internal consistency, predictive and convergent validities, it has poor discriminate validity (Speckens, 2001). The measure may not for example, differentiate between panic and hypochondriasis patients (Martinez et al., 1999). Aronson and colleagues (2001) found that although SSAS scores had expected associations with illness worry, there were higher correlations with negative affectivity. These findings have lead some reviewers to the conclusion that SSAS may not be specific to health anxiety and be a measure of general distress rather than sensitivity to somatic sensations per se (Aronson et al., 2001; Duddu et al., 2006).

Despite these possible limitations; the strong relationship between scores on SSAS and health anxiety measures and minimal content overlap with symptoms of physical disease mean that the SSAS measure might have utility in explaining health anxiety particularly for an older adult cohort.

Health Anxiety

There are several structured interviews and self-report tools available for assessing health anxiety and hypochondriasis (Speckens, 2001; S. H. Stewart & Watt, 2001). Available self-report scales are the Whitley Index (WI, Pilowsky, 1967), Illness Attitude Scales (IAS, Kellner, 1987), Illness Behaviour Questionnaire (IBQ, Pilowsky & Spence, 1994), Health Anxiety Questionnaire (HAQ, Lucock & Morley, 1996), Multidimensional Inventory of Hypochondriacal Traits (MIHT, Longley et al., 2005) and the Health Anxiety Inventory (HAI, Salkovskis et al., 2002). Although all have empirical support, only two, the HAQ and HAI, were developed from cognitive theory and are considered in more detail.

The HAQ, developed by Lucock and Morley in 1996 from cognitive theory, measures the continuum of health anxiety and discriminates between general anxiety and health anxiety. The questionnaire showed good to excellent psychometric properties. Unfortunately, the literature search found no independent studies to confirm the validity of the measure and others have noted that the measure may not differentiate between individuals with physical illness versus health anxiety (Rode et al., 2006).

Like the HAQ, the HAI (Salkovskis et al., 2002) was developed from cognitive theory, designed to measure health anxiety as a continuous construct, and more important for this study, differentiate between those with physical illness and high and low health anxiety. The development research for the 23 item questionnaire (Health Anxiety Inventory, HAI) consisted of five studies designed to test the ability to differentiate between health anxiety and other psychiatric conditions, sensitivity to treatment effects, consistency and test retest validity and to compare the properties of a 14 item short version of the inventory (SHAI) with the full version. A final study described the development of an additional four-item scale to measure the "awfulness" component of health anxiety.

The first development study showed that the HAI has significant specificity to hypochondriasis by comparing two groups of patients, one with a diagnosis of hypochondriasis and the second with other disorders (Salkovskis et al., 2002). This finding was supported by an independent study that reported the total score on the Short Health Anxiety Inventory (SHAI) differentiated hypochondriasis and panic patients (Abramowitz, Olatunji, & Deacon, 2007).

Clinical validity of the measure was demonstrated when treatment significantly reduced HAI scores compared to a wait list group, (Salkovskis et al., 2002). Subsequent randomised control studies have shown similar effects (Barsky & Ahern, 2004). The third study compared patients with and without actual illness; data showed that HAI scores were not substantially raised in patients with physical illness. This relative independence from physical illness has been further demonstrated in a study with older adults, where physical illness had a small but significant correlation with SHAI, but did not predict health anxiety (Boston & Merrick, 2010). The fourth study compared the properties of the 23-item version with a 14-item version Short Health Anxiety Inventory (SHAI), which showed that both measures had similar psychometric properties and SHAI had a single factor structure. The report concluded that the SHAI might have greater utility because of its brevity. The last

study described the negative consequences of illness (SHAI-NC) scale. The SHAI-NC scale was shown to be highly specific to health anxiety and independent of the main SHAI scale.

Psychometric properties of the SHAI and SHAI-NC scales have been independently tested in clinical samples, medically healthy university students and pregnant women (Abramowitz, Deacon, et al., 2007; Abramowitz, Olatunji, et al., 2007; Alberts, Sharpe, Kehler, & Hadjistavropoulos, 2011; Kowalyk & Hadjistavropoulos, 2007; Wheaton, Berman, Franklin, et al., 2010). While these studies confirm the construct validity of the scale and independence of the SHAI-NC scale, the factor structure of the SHAI scale is less clear. Six previous studies have analysed the factor structure of SHAI in various populations. Three exploratory analyses and three confirmatory analyses have been reported. All studies to date have examined the factor structure in adult populations, but none has included adults over 65 years.

The initial development study by Salkovskis et al., (2002) studied clinical patients with anxiety disorders and/or hypochondriasis and non-patient controls, some with chronic illness. Full data from the analysis was not reported, but the authors concluded that for the 18 item scale, a two-factor solution was most parsimonious. The first factor consisted of the first 14 items of the scale and the second factor (negative consequences scale) consisted of the last four items. Two further exploratory factor analyses of the 18 item scale have been reported.

Abramowitz and colleagues (2007) studied the factor structure in a sample of 442 university students. The authors concluded that a three-factor structure was most parsimonious, with the last four items loading onto a single factor. A further study by Kowalyk & Hadjistavropoulos (2007) examined the factor structure among 253 pregnant women. This study also identified a three factor solution with the third factor consisting of the last four items of the questionnaire. These results indicate that the last four items load onto a single negative consequences scale (SHAI-NC). There was however less consistency in the structure of the first fourteen items. Initial development studies suggested that they formed a single factor, however this was not supported in subsequent studies. Differences in the reported factor structures are illustrated in Appendix E.

To provide more clarity, confirmatory analyses have been carried out. As part of a larger study, Abramowitz, Olatunji, and Deacon, (2007) carried out a Confirmatory Factor Analysis (CFA) of the 18 item SHAI. Participants were 157 adults with diagnosed

hypochondriasis or an anxiety disorder. The authors analysed one factor, two factor (from Salkovskis et al., (2002) and three factor from Abramowitz, Deacon et al., (2007) solutions. The authors concluded that the two and three factor solutions were equivalent.

Wheaton and colleagues (2010) hypothesised that a probable reason for discrepancies in the factor structure of first 14 items of SHAI was that the analysis methods assumed items were on a continuous scale. These authors argued that because the items are presented as a series of individual statements, they are not a continuous scale but an ordered ordinal scale and that previous analysis had not acknowledged this. Wheaton and colleagues (2010) studied 636 undergraduates, and analysed the factor structure using an estimation method that compensated for a non-continuous scale. Exploratory factor analysis for a randomly selected group confirmed a two-factor solution with the last four items loading onto one factor. A confirmatory factor analysis of the remaining data confirmed the two-factor solution. Wheaton and colleagues (2010) called these two factors the SHAI illness likelihood scale (SHAI-IL) and the SHAI negative consequences scale (SHAI-NC). For clarity, these descriptions were adopted in the present study.

In summary, there are inconsistencies in the findings regarding the factor structure of the 18 items of SHAI. Exploratory analyses indicate that the 18 items of the SHAI form three factors, there are however, inconsistencies in these factors across populations. Confirmatory analysis shows that a two factor solution comprising the first fourteen items on one factor (SHAI-IL) and the last four items on a negative consequences factor (SHAI-NC) is likely the most parsimonious solution.

Chapter Summary

This chapter has provided an overview of the psychological measures of interest in the current study. The review has shown that there are limited options for measuring anxiety sensitivity, body vigilance, somatosensory amplification and health anxiety. Available evidence suggests that the measures are valid and reliable in the general population; however, none have been validated for older adults.

The review also highlighted that the available measure of body vigilance was designed to assess vigilance to autonomic sensations in panic and not health anxiety. This suggests that a modification to the BVS measure may be prudent to provide a more comprehensive assessment of the combined effects of autonomic and non-autonomic sensations in health anxiety.

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CHAPTER 6 - THE PRESENT STUDY

Before beginning, plan carefully.

Cicero

The previous chapters have shown that despite the longstanding interest in the medical and psychological literature, there is surprisingly little consensus about many aspects of health anxiety and the related construct of hypochondriasis in the general population. Critically, although clinical experience and limited epidemiological evidence suggest that health anxiety increases with age, few studies have specifically investigated health anxiety in older adults. The overall aim of this study is to contribute to the limited body of knowledge of this topic.

Cognitive explanations of health anxiety have empirical support in the general population. Within the cognitive model, beliefs about, vigilance to and amplification of bodily sensations in the genesis and maintenance of health anxiety are emphasised. These cognitive features and the phenomenological similarity between health anxiety and other anxiety disorders, has led to research investigating the contribution of specific cognitive constructs associated with body perception, in the explanation of health anxiety. Previous chapters have shown that the specific body perception constructs of anxiety sensitivity, body vigilance and somatosensory amplification, are useful in explaining health anxiety in the general population; however, little is known about their relationship to health anxiety in older adults.

Three strands of research with older adults were identified suggesting that body perception may be an important factor in health anxiety in older adults. First, there is a greater emphasis on physical health with increasing age (Knight & Laidlaw, 2008), second, limited evidence indicates that body awareness in older adults is greater than that for younger adults, especially when the older adult holds negative beliefs about aging (e.g. Montepare, 2006). Finally, cognitive symptoms of anxiety may be more important for older adults (e.g. Roberts, 2010).

Cognitive theories of health anxiety assume attention to and beliefs about physical sensations may assume increased importance given the increased likelihood of physical problems with age. Anxiety sensitivity and somatosensory amplification are under researched in older cohorts and there appear to be no studies specific to body vigilance.

Considering the extant studies of health anxiety in older cohorts, several limitations were identified. First, the study by Boston and Merrick (2010) appears to be the sole study conducted within a cognitive behavioural framework. Second, studies have frequently used the IAS (Kellner, 1987) to measure health anxiety (e.g. Bravo & Silverman, 2001, Bourgault Fagnou & Hadjistavropoulos, 2009). As noted in Chapter 4, this measure may provide inaccurate estimates of health anxiety in older adults with chronic disease because some items measure features of physical illness rather than health anxiety. Third, most studies have provided limited control of variables that may contribute to health anxiety. While all for example, have provided some measure of physical illness, others have not accounted for other important aspects of physical health such as pain or disability (e.g. Bravo & Silverman, 2001, Boston & Merrick, 2010). Finally, the study by Bourgault Fagnou and Hadjistavropoulos (2009) appears to be the only study to date that has made direct comparisons with a younger cohort to discover whether there are any noteworthy differences in aspects of health anxiety between age groups.

The current study addresses questions arising from these shortfalls in the literature. Specifically, the current study examines relationships between health anxiety and the constructs of anxiety sensitivity, body vigilance and somatosensory amplification among older adults within a cognitive behavioural framework. In addition, the influence of demographic variables, physical health and current depression and anxiety in these relationships are examined. In order to signal possible cohort specific differences and provide a comparison with prior research, a younger group of adults is included in the study.

Measurement issues were examined in Chapter 5. Of concern to the present study was adequate measurement of body perception and health anxiety variables as none of the extant measures have been validated in older adult cohorts. To provide confidence in the reliability and validity of the body perception and health anxiety measures proposed for the study; a review of the adequacy of the body perception and health anxiety measures was carried out for the older cohort. Additionally, body vigilance in health anxiety includes vigilance for autonomic and non-autonomic sensations (Salkovskis, 1996), and the measure of body vigilance proposed for the current study measures only autonomic symptoms found in panic. To discover the influence of non-autonomic symptoms in health anxiety, an evaluation of an adapted version of the body vigilance measure was proposed.

The present study comprised three interrelated investigations. The principal investigation concerned the relationships between body perception and health anxiety in older adults. In parallel with the principal investigation, an examination of the adequacy of the body perception and health anxiety measures was carried out. This comprised two stages; first, a trial survey was conducted prior to main data collection to evaluate suitability of the measures in the older cohort. Results of this informed the content of the final survey package. Following main data collection, preliminary analysis was conducted to provide assessment of the factorial adequacy of measures. Finally, to discover the influence of non-autonomic symptoms in health anxiety, an adapted version of the body vigilance measure was evaluated. This process is illustrated in Figure 2.

Research questions and hypotheses

From the above, the following research questions and hypotheses were formulated.

Preliminary study

Is the factor structure and internal consistency of health anxiety, anxiety sensitivity, body vigilance, somatosensory amplification measures for older adults comparable to that found for younger adults?

Principal study

In which ways do the health anxiety, anxiety sensitivity, body vigilance and somatosensory amplification variables differ for young and older adults.

From the available research it is expected that

- Health anxiety scores will be significantly lower for older adults when compared with younger adults.
- Anxiety sensitivity scores will be significantly lower for older adults when compared with younger adults.
- Body vigilance scores will be significantly higher for older adults when compared with younger adults.
- Somatosensory amplification scores will show no significant differences between older adults and younger adults.

Which variables are statistical predictors of health anxiety in older adults, and how do they differ from those for younger adults.

It is expected that

- Demographic factors will not significantly predict health anxiety in either cohort.
- Physical function but not medical morbidity will predict health anxiety in older adults.
- Current distress (i.e. anxiety and depression) will predict health anxiety in both cohorts.
- Consistent with the cognitive behavioural model, after controlling for demographic, physical health and current distress variables, anxiety sensitivity, body vigilance and somatosensory amplification will predict health anxiety for both groups.
- Body vigilance will be a stronger predictor of health anxiety in older adults than younger adults.

Evaluation of BVS-H

What effect does the revision to the BVS scale have on the relationships between body vigilance and health anxiety and what is the factor structure of this measure?

It is expected that:

- Consistent with the cognitive behavioural model, the BVS-H scale will be a better predictor of health anxiety than the original BVS scale.

Contribution of the current study to the literature

The principal aim of the present study is to increase the body of knowledge about health anxiety in older adults. This will be achieved in several ways. First, the study will provide new evidence of the utility of the cognitive theory of health anxiety as an explanatory model of health anxiety in older adults. Additionally, to remedy shortfalls identified in previous studies with older adults, the study includes a comparison cohort of younger adults. This will identify cohort specific differences in the associations between body perception variables and health anxiety. A comprehensive consideration of other variables that may contribute to health anxiety is included. Moreover, a parallel study of the adequacy of selected measures not only provides preliminary evidence of the usefulness of the health anxiety and body perception measures in older adult research, but

also strengthens the overall conclusions of the study. Finally, this study will provide an assessment of the influence of non-autonomic symptoms in health anxiety by examining the utility of a modified version of the body vigilance scale. It is hoped that the present study will provide new insight into factors contributing to health anxiety in older adults, which may then inform research and clinical interventions.

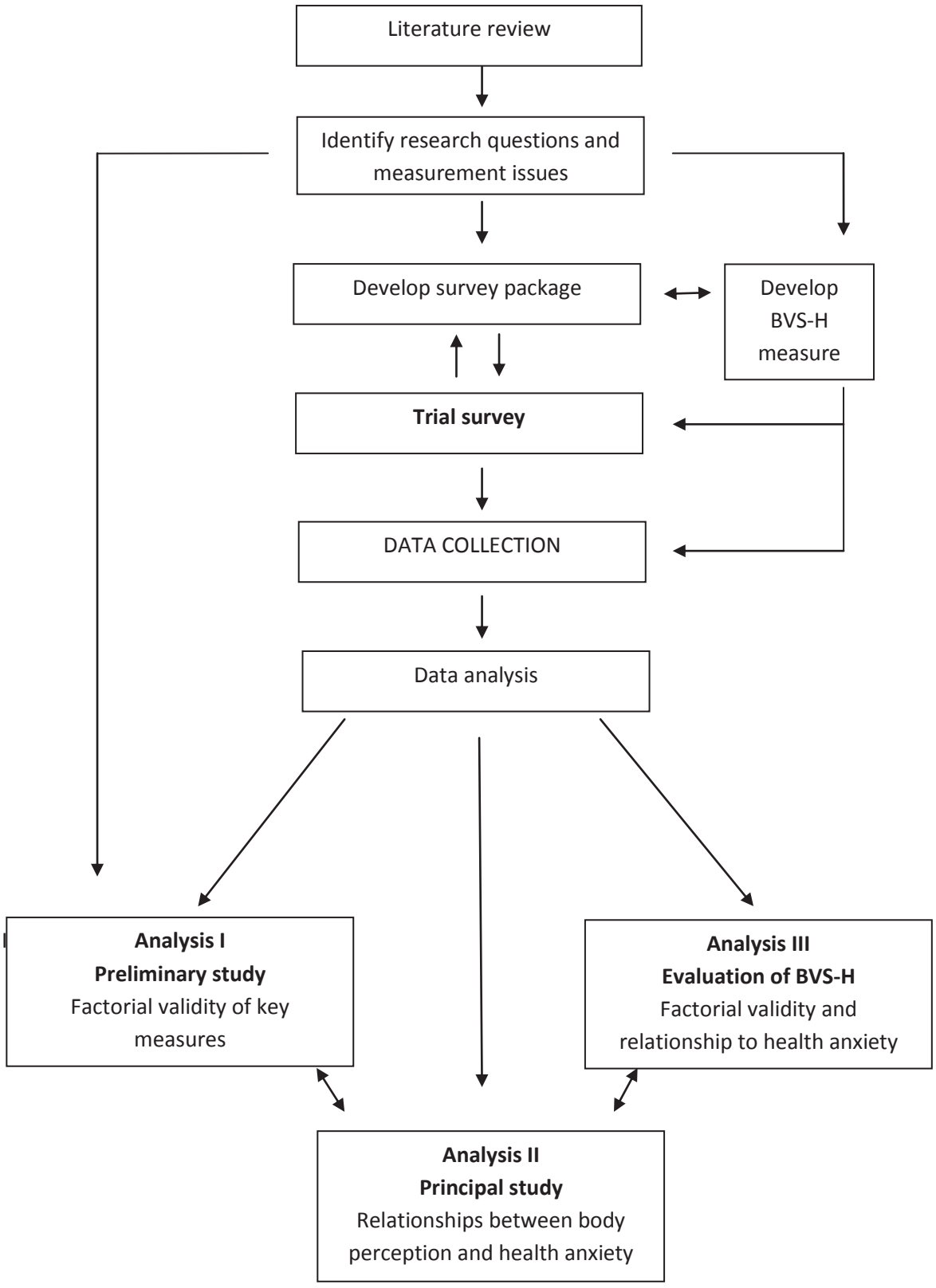

Figure 2. Current study flow chart

CHAPTER 7 - METHODOLOGY

"....so much about growing older, aging, and later life is not simply about health and so much of our health is not simply about individual, organic determinants."

Steven Katz[3] 2012

Chapter 5 outlined considerations in the selection of key measurement instruments for the present study. This chapter focuses on general aspects of the study design and final measure selections. A summary of findings from a trial survey conducted to test the acceptability of the final questionnaire package is included. The chapter concludes with a description of the Method for the full study.

Survey Design

General Considerations

The current study was a self-report, anonymous cross-sectional survey of two groups of adults. When undertaking survey research, a number of factors need to be taken into consideration; these are; age limits for the sample, accounting for the effects of cognitive decline in older adults, validity and intelligibility of measures and practical considerations such as the length, legibility and delivery mode of the survey.

Two groups were proposed for the present study, a group of older adults and a young adult group. To permit comparisons with prior research, age limits for the comparison group for the current study were 18 to 30 years. The lower age limit for research with older adults varies considerably across studies and can be arbitrary, for example, some studies use 55 as a cut off for 'older age' and others use 60 or 65. The lower age limit for the older adults group in this study was 65 years. The rationale for this was that current age of retirement in New Zealand is 65 years for both men and women, which (while acknowledging that many people continue to work after this age) delineates a stage of potential social and psychological change. In addition, much of the epidemiological research in New Zealand and elsewhere uses this age to mark older age.

[3] http://www.trentu.ca/showcase/documents/ShowcaseSpring2012.pdf

Cognitive decline is a potential difficulty encountered with increasing age, and controlling for this confound was an important component of the design. Self reports of cognitive function in older adults may be reliable but not valid because of inaccuracy in self evaluation of performance, particularly in cases of mild cognitive impairment (McDowell, 2006). The most effective means to screen for cognitive competence is by personal interview or informant assessment (McDowell, 2006). The self-report methodology proposed for the current study ruled out these avenues. The assumption was made that the ability to both complete and return the questionnaire package would be indicative of cognitive competence.

Many of the available psychological measures have not been validated for an older population and often do not address the concerns of older people (see Wolitzky-Taylor et al., 2010). To allow comparisons across measures and between the two groups, the same survey package was used for both the younger and older groups. Measures used were therefore chosen to satisfy the requirements of both groups. A final consideration was achieving a balance between obtaining sufficient information to produce meaningful results and a survey that was too lengthy, which would reduce completion rates.

Finally, delivery mode of the survey was considered, specifically, should the survey be delivered in hardcopy or online. Because of limited computer literacy among the oldest old, there was a strong likelihood that online delivery would limit the age range of older adults, therefore online delivery was not considered for this group. To avert possible differences in responses between online and hardcopy delivery of the survey, online delivery was discarded as an option for the younger group.

Ethical Considerations

Three basic rights must be addressed in questionnaire surveys: informed consent, privacy and confidentiality (Bersoff & Bersoff, 2000). These were fulfilled by following protocols set by the Massey University Human Ethic Committee. Informed consent and privacy were outlined in the Information sheet. Anonymity is an important component of confidentiality and privacy in this study. This was preserved by ensuring that the researcher did not have access to participants' personal details. The content of the questionnaire also presented a potential ethical dilemma. Extreme responses on psychometric measures of anxiety and depression indicate probable intense distress, however because responses were anonymous, it would not be possible contact the individual or provide assistance (Bersoff & Bersoff, 2000). To safeguard individuals, a note was added at the end of the

questionnaire directing the person to contact a health professional if the survey had raised any concerns. The note also gave details of the clinical supervisor for this study as an alternative contact.

Sample Size

There were a number of analyses proposed in the present study, all of which have particular requirements for sample size. It was anticipated that there would be three types of statistical analysis undertaken: group comparisons, multivariate regression and factor analysis. Sample size requirements are determined by the balance between effect size and power and depend on the analysis undertaken. Assuming effect size =.5 and power =.8, *s*ample size for *group comparisons* from tables in Aday & Cornelius, (2006) is 65 per group. From Tabachnick & Fidel, (2002), the minimum sample size for *regression analysis* is the larger of N = 50 + 8m or N = 104 + m, where m = number of independent variables. Assuming m = 10, then N = 130 per group.

There is little consensus in the literature on the subject of appropriate sample size for factor analysis, which are regarded as large sample methods, although there is little agreement about what constitutes a 'large' sample (Kline, 2011). Sample size depends on factors such as model complexity, multivariate normality of the data and the type of statistical estimation method used. There are various recommendations for sample size in factor analysis. Tabachnick and Fidel (2007) suggest that in an exploratory factor analysis an "absolute minimum" is five participants per variable and no less than 100 participants. There are a variety of recommendations for optimal sample size in confirmatory factor analysis. These range from a minimum sample size of 100 participants, to algorithms that allow for model complexity and missing and non-normal data (Kline, 2011). MacCullum, Browne & Sugawara (1996) for example, calculated sample size for confirmatory factor analysis as a function of the degrees of freedom of the model and power. From tables given by MacCullum et al., (1996) if power is .8 and d*f* = 100; minimum N required = 178.

From the above, a minimum sample size of 150 -200 participants in each group would be sufficient for each of these analyses. An initial goal of 200 participants per group permitted a margin of error for missing or incomplete data.

Measurement Issues – Control Variables

To address the limitations identified in previous research, an essential feature of the present study was to provide comprehensive control of potential confounds in the

relationships between health anxiety and body perception variables. These were identified as physical health, depression and anxiety. The following discussion outlines considerations in the selection of these measures.

Health

Most extant studies of health anxiety and body perception constructs have either ignored physical health considerations (Wheaton, Berman, Franklin, et al., 2010) or excluded those with medical illness (Abramowitz, Deacon, et al., 2007). These avenues were not practicable for the current study as a majority of older adults have a medical diagnosis. Health status is also a significant confound in the relationship between health anxiety and the measures of body awareness and anxiety sensitivity. These factors meant that measurement of health was particularly important in the present study.

General considerations

The World Health Organisation defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (World Health Organization, 1958, p. 459). This overarching definition was considered too broad for the scope and purpose of the present study, and it was deemed more appropriate to consider particular indices of health that prior studies have shown to be factors in health anxiety.

Health measurement is a complex issue and is realised in a variety of ways. McDowell (2006) noted that health measurement ranges from the particular, for example organ systems, to the general, such as overall wellbeing and quality of life. Health measurement is frequently carried out by health surveys. Health survey instruments may provide a health index score and/or a health profile. The *health index* is an aggregate score of the various measures under consideration; whereas *health profiles* give scores on component domains and thus more detailed information.

Among the most commonly used health surveys are instruments derived from the RAND Medical Outcome Study such as the Short Form 36 (MOS SF-36, Ware & Sherbourne, 1992). This short form survey provides physical and mental health indices together with a more detailed health profile covering domains including; physical function, role limitations, bodily pain, social functioning, general mental health, vitality and general health perceptions. This short form is available in two versions the SF36™ (Ware, Kosinski, & Dewey, 2000) and the RAND-36 (Hays, Sherbourne, & Mazel, 1993). The two versions have

virtually identical wording but different scoring metrics, especially for the health indices. These differences have been the subject of much academic debate, which is beyond the scope of this study to examine (see Taft, Karlsson, & Sullivan, 2001; Ware & Kosinski, 2001 for discussion); nonetheless, the individual health profile scores provide similar results.

The health index approach was deemed too broad for the present study, as it would obscure valuable information about the relative contribution of different factors to health anxiety. Additionally, health indices were not useful constructs in this context because they are a mixture of objective and subjective measures. Finally, the mental health index would duplicate other measures in the survey. Accordingly, inclusion of the 36-item survey would provide redundant information and would make the study questionnaire overlong. A condition of use for the SF36™ is that the entire survey is presented; while the RAND-36 has no limitations on use (see personal correspondence Appendix A 1 and http://www.rand.org/health/surveys). Health profiles selected from the RAND-36 are discussed in later sections.

As noted in the previous chapters, likely contributors to health anxiety are subjective health, medical morbidity, physical ability and pain. This section will briefly review measurement of these aspects of health and then provide details of the particular instruments chosen for the present study. To assist in this process, a selective review of studies with older adults was carried out to provide a comparison of the various measures used in prior work (see Table 1). As a comparison, studies of younger groups cited in the literature review were also included.

Subjective health

Subjective health is a frequently used indicator of health and well-being (McDowell, 2006) and, as discussed in the previously, predicts health anxiety (e.g., Barsky et al., 1992). There are several methods for assessing subjective health, including single item measures and sub-scales of larger questionnaires. McDowell (2006) gave a review of single item subjective health questions and found that they are reliable and valid, and one of the best indicators of mortality and perform almost as well as multi-item scales. McDowell cautioned, however, that single items could be confusing for some respondents. The RAND-36 has a “general health” scale that comprises five questions that provide negative and positively worded items to control for response set (Ware & Sherbourne, 1992).

Medical morbidity

Subjective health varies with psychological well being however, and may confound the dependent and independent variables (Lawton & Lawrence, 1994). Although subjective health is a useful indicator of overall wellbeing, objective measurement of medical morbidity is less likely to be a confound. As noted in previous chapters, physical disease is associated with anxiety and depression (El-Gabalawy et al., 2011; Gale et al., 2011; Hendrie et al., 2006; Penninx et al., 1996) and in epidemiological studies, contributed to health anxiety (Bleichhardt & Hiller, 2007; Looper & Kirmayer, 2001; Noyes et al., 2005). To control for possible confounding between physical health and health anxiety, objective measurement of medical illness was essential in the present study. Evaluation methods include doctor assessments, standardised scales, a symptoms list or a disease list (Lawton & Lawrence, 1994).

The scope and self-report methodology proposed for the current study excluded doctor assessments. Standardised scales are usually long and, in the interests of survey brevity, were excluded. A symptom list is a frequently used strategy, however may be confounded by psychological status and somatic symptoms in health anxiety (Liang & Whitelaw, 1990). Further, symptom lists have content that overlaps with other measures proposed in the current study, and would therefore be redundant measures.

As can be seen from Table 1, a disease list is a frequently used strategy, as it is usually regarded as an objective measure because the participant has been given this information by a health professional and is, in theory, verifiable (Lawton & Lawrence, 1994). Although self-reports of disease may be subject to memory lapse and bias; this strategy is used in large scale health surveys (e.g., Massey University Health, Work, and Retirement Survey, see http://hwr.massey.ac.nz/) and are reasonably accurate and reliable when compared with physician diagnosis (Farmer et al., 2008; Kriegsman, Pennix, van Eijk, Boeke, & Deeg, 1996).

A second aspect of physical illness is the effect of burden of disease and comorbidity. Burden of disease is a composite measure of mortality and morbidity. The most common type of measures are based on Disability Adjusted Life Years (DALY) which is used in epidemiological studies (Ali Hyder & Morrow, 2006), and not appropriate for this study. Health indices from the RAND-36 health survey are often used as indicators of disease burden, however for reasons elucidated above, this was not considered.

Inspection of Table 1 shows that the study by Bourgault-Fagnou and Hadjistavropoulos (2009) used a measure of disease burden that combined several concepts into one score. This measure was not suitable for the current study as it not only included subjective health, but also, was not a self-report measure. A second measure of burden of disease is comorbidity. The issue of the effects of comorbidity are quite complex and difficult to measure in self-report studies. There are, however, two possible proxy measures of comorbidity and disease burden found in the literature; total number of diseases and an assessment of the severity of illness (Mortality and Morbidity Weekly Report, 1989; Rosenberg, Hayes, & Peterson, 1987; Wyler, Masuda, & Holmes, 1968).

Aggregate number of chronic diseases has been used in several studies with older adults and is considered a reliable objective proxy to measure burden of illness (Mortality and Morbidity Weekly Report, 1989). Inspection of Table 1 shows that this measure has been used in both interviewer administered and self–report studies with older adults. Seriousness is frequently assessed as sick days, hospitalisations and doctor visits, however individuals experiencing high health anxiety are frequent users of health facilities and these measures were likely to confound the health anxiety measures. A more objective measure of seriousness is the Seriousness of Illness Rating Scale (SIRS, Wyler et al., 1968).

The Seriousness of Illness Rating Scale (SIRS) is a rank order quantitative scale of commonly occurring illnesses first developed by Wyler and colleagues in 1968, then updated by Rosenberg and colleagues in 1987. The SIRS is a weighted interval level system that allows comorbidity to be measured as the sum of the seriousness scores (Rosenberg et al., 1987). The revised version proposed by Rosenberg (SIRS-R) is an ordinal scale and does not allow this approach. While using the original SIRS scale would allow some estimate of comorbidity, the study by Rosenberg and colleagues found that even in 1987, the ratings were out of date and did not reflect medical advances at that time. This indicates that some 40 years on, this would be an unsuitable measure of seriousness.

There is a strong correlation between the number of conditions and the summation of seriousness scores, and some researchers argue (e.g., Garrity, Marx, & Somes, 1978) that the number of conditions is a sufficient proxy for seriousness. Others have used the median SIRS-R score to dichotomise illnesses into serious/less-serious groups (Holahan et al., 2010). The longitudinal study by Holahan and colleagues indexed this measure of seriousness against mortality over the study period. After controlling for age, increased seriousness predicted mortality, which verified criterion validity of the dichotomised

seriousness measure. One study of hypochondriasis has used the SIRS-R approach. This research generated seriousness ratings for the most serious presenting illness (Kirmayer & Looper, 2001; Robbins & Kirmayer, 1996). These authors noted however, that this was likely to underestimate of the effects of seriousness of illness because accumulative comorbidity was not accounted for.

Table 1

Measures of physical health in health anxiety studies

Study	Population	Measures	Comment
Older adults Health anxiety/ hypochondriasis studies			
Barsky, Frank, Cleary, Wyshak, & Klerman (1991)	Hypochondriasis patients and comparison group. Separated into over and under 65.	Medical morbidity assessed by doctors, weighted medical diagnosis. Separated major and minor diagnoses. Physician rating on a 5 point scale	Not self report, physician ratings
Bourgault-Fagnou & Hadjistavropoulos (2009)	Two groups; students and community dwelling older adults over 65	Younger participants excluded if illness present. Edmonton frail scale, pain measurement	Edmonton frail scale Interviewer administration. Measure includes cognition, days in hospital, number of medications, subjective health, mobility and independence
Boston & Merrick (2010)	Community dwelling older adults over 65	Number of illnesses and number of prescriptions. RAND -36 physical function scale	Self-report study
Bravo & Silverman (2001)	Adults over 60. Two groups; clinic referred group with depression and non-clinic referred group	22 item illness checklist, frequency scores + history of illness	Interviewer administered survey.
Frazier and Waid (1999)	Community dwelling older adults	General health scale by Belloc, disease list and number of prescriptions	Interviewer administered survey. Belloc scale measures pain, health concern, health interference, comparative health, sick days, doctor visits and hospitalisations in the last year

Table 1 continued: **Other older adults studies**

Study	Population	Measures	Comment
Sheehan et al., (2003). Somatisation	Primary care attendees age range 65-94	Burvill scale	Physician rated scale
Jung et al., (2003) SSAS study	Two groups; younger mean age 36 years, older mean age 59 years	Symptom checklist -90-R	Self-report
Depp et al., 2005. Non-clinical panic	Two groups, community dwelling older and younger adults	Belloc scale plus yes/no to 9 physical illnesses in the previous 12 months and medication count	Self-report study. Subjective health and illness count.
Andrew & Dulin (2007)	Community dwelling older adults age range 70-92	Self rated health	Self-report study
Ostir & Goodwin (2006). Anxiety and mortality	Community dwelling older adults, mean age 81 years	Illness count of selected chronic diseases and self rated health	Interviewer administered survey.
El-Gabalawy et al., (2011). Anxiety and physical disease	Older adults over 55 years	Illness count of self-reported selected chronic disease and subjective health	Interviewer administered survey.
Brenes (2008). Anxiety, depression and disability	Adults aged 18-94 years. Mean age 57 years	Checklist of 50 health problems, current prescription medications and number of doctor visits in the previous year.	Self report. Disability MOS-SF36 physical function subscale
Holahan et al., (2010) Depression and illness	Depressed patients and Community controls aged 18-88	Checklist of 14 medical conditions. Absence/presence of one or more conditions, and split at median SIRS-R score	Self report longitudinal study.
Younger adults Health anxiety/ hypochondriasis studies with control for illness			
Robbins and Kirmayer (1996). Same data reanalysed by Looper and Kirmayer (2001)	Primary care patients age range 18-75 mean age 44.7 years	Medical records review. Illness burden by SIRS-R score for most serious illness	Interviewer administered. Severity measure was aggregate of SIRS-R and physician rating of disability and illness
Abramowitz, Deacon and Valentiner (2007)	Undergraduate students	Participants excluded if had diagnosed current illness	Self report

Considering the research presented above and in Table 1, the present study used a disease list as the measure of medical morbidity and aggregate number of illnesses as a measure of comorbidity. The disease list consisted of conditions from the Massey University Health, Work, and Retirement Survey (see http://hwr.massey.ac.nz/). This disease list included musculoskeletal conditions (e.g. arthritis), heart conditions, cancer, and lung and respiratory disease. In addition, functional somatic syndromes such as chronic fatigue and irritable bowel were added to acknowledge their relationship with health anxiety. In addition, participants were asked if any illness had been diagnosed within the previous six months to provide a measure of chronicity. To discover more about the seriousness of illnesses and subjective worry about illnesses, a series of questions were formulated about any illnesses that had required specialist care, including; year of diagnosis, specialist visits, hospitalisations and subjective worry about the condition.

Physical function

Physical function has been associated with health anxiety in many community studies (see Creed & Barsky, 2004), and therefore it was important to account for this relationship. There are a large number of measures of physical function ranging from the generic, to those for specific diseases such as arthritis. Some measures are observational, others self-report (McDowell, 2006). Most measures differentiate functional and physical disability, where functional disability includes mental and social factors. Again, efforts were made to select an objective measure of physical disability to minimise the confounding effects of subjective assessments. An additional consideration was to ensure that the measure was suitable for relatively healthy individuals and relevant for the younger group of participants.

Of seventeen measures reviewed by McDowell (2006), only three were self-report and suitable for population surveys. Further inspection of content of these three instruments found that two had an emphasis of disabilities and asked questions such as "*Can you get in and out of bed?"* and "*Can you cut your toenails?"* (OECD Long Term Disability Questionnaire, cited in McDowell, 2006), which would have had poor face validity for the younger group. The third instrument was the Medical Outcomes Survey (MOS) Physical Function Measure (A. L. Stewart & Kamberg, 1992). The scale developers were careful to include only physical activities that were not affected by social circumstances. Stewart and Kamberg (1992) argued for example, that meal preparation is subject to social norms and may not reflect actual function; therefore, this was not included. Part of this

instrument is identical to the physical function scale in the RAND-36 health survey (Hays et al., 1993). The large WHO study by Gureje and colleagues (1997) and a study of anxiety and disability in older adults (Brenes et al., 2008) used the physical function scale from the MOS SF-36 scale. The MOS Physical function Scale is considered useful for health surveys, is sensitive to variations in physical function in high functioning individuals (McDowell, 2006), The measure also has good psychometric properties ($\alpha = .92$) and is useful for healthy populations (McDowell, 2006) and was therefore suitable for the present study.

Pain

As discussed in the literature review, there is a strong relationship between health anxiety and chronic pain and providing a measure of control for this relationship was an important part of the health measures in the present study. Objective measurement of pain is not possible, as pain is a subjective experience influenced by biological, cultural, social and psychological factors (McDowell, 2006). Pain measurement ranges from visual analogue scales rating pain severity to detailed interviewer schedules for clinical use (T. Hadjistavropoulos, Hunter, & Dever Fitzgerald, 2009; McDowell, 2006). Visual analogue and verbal rating scales are generally a useful and valid method of measurement of pain severity in both general populations and with older adults (T. Hadjistavropoulos et al., 2009; McDowell, 2006). Some studies have shown however, that reliability reduces with age and the format may not be suitable for self report without prior guidance (McDowell, 2006).

Studies with older adults have used a variety of measures. In their study of health anxiety and older adults, Bourgault-Fagnou and Hadjistavropoulos (2009) used the Geriatric Pain Measure (Ferrell, Stein, & Beck, 2000), however this was developed to measure pain in older adult populations and was likely to be unsuitable for the present study. Other studies of pain and health anxiety (e.g., Keogh & Cochrane, 2002; Tang et al., 2007) have generally used the short form of the McGill Pain Questionnaire (Melzack, 1975), which was too detailed for the current study. In McDowell's review, only one self-report pain measure was noted, the MOS Pain measure (Sherbourne, 1992). This instrument was developed to measure the impact of pain and not pain associated with a particular disease (McDowell, 2006; Sherbourne, 1992).

In the development of the MOS SF-36, this 12 question pain scale was reduced to two items, one measuring the frequency of pain; "How much *bodily* pain have you had during the *past 4 weeks"*? A second question measures intrusion on normal activities; "During the *past 4 weeks*, how much did *pain* interfere with your normal work (including

both work outside the home and housework)?" (Ware & Sherbourne, 1992). This second item was chosen by Ware and Sherbourne (1992) because it was the best predictor of the behavioural effects of pain in the original MOS study. When administered as part of the complete short form survey, this two item bodily pain scale had a Chronbach's alpha in the range .9 to .81 (McDowell, 2006). Correlation between the bodily pain sub-scale and mental health scale on the MOS SF-36 health survey for the two items was .29 and .33 (Mchorney, Ware, Lu, & Sherbourne, 1994). Correlations with other scales were: physical function .53 and general health .44. The two item bodily pain scale was relatively immune to floor and ceiling effects and has been used in studies with older adults (McDowell, 2006; Mchorney, Ware, et al., 1994).

In the interests of survey brevity, the two-item scale from RAND-36 was chosen as a concise indicator of pain that was suitable for both groups, was not likely to show significant floor and ceiling effects and was unlikely to be highly correlated with measures of mental health, thereby minimising the confounding effects of this unavoidably subjective measurement.

Current Depression and Anxiety

Depression and anxiety contribute to health anxiety and control for these factors was an important feature of the study. The key consideration in the selection of measures for this section of the survey was the difficulties in the measurement of depression and anxiety among older adults. Many instruments have not been validated for use with older adults and most have a number of items measuring somatic symptoms which could overlap with medical symptoms (Bryant, 2010; Wolitzky-Taylor et al., 2010). To illustrate, frequently used measures such as the Beck Anxiety Inventory (BAI, Beck & Steer, 1990) and Beck Depression Inventory (BDI, Beck & Steer, 1987), have good psychometric support (McDowell, 2006). They have however, a large number of items measuring somatic symptoms (e.g. 14 of 21 items on the BAI). To overcome this shortcoming, there have been two measures developed that are specifically for use with older adults, the Geriatric Depression Scale (Yesavage et al., 1983) and the Geriatric Anxiety Inventory (Pachana et al., 2007). While these would have been the most suitable for the older group, they are not validated or suitable for use with young adults, and not appropriate for the present study.

A measure with fewer somatic items is the Depression Anxiety Stress Scales (DASS) measure developed from Clark and Watson's (1991) hierarchical tripartite model explaining the common and unique features of depression and anxiety. Initially a 42-item measure,

DASS is also available as a 21-item version (DASS-21, Lovibond & Lovibond, 1995). The DASS-21 has three scales, measuring a continuum of depression, anxiety and stress. McDowell (2006) noted that the measure also provides an evaluation of general psychological well-being. The depression and anxiety sub-scales correspond to DSM-IV criteria for mood and anxiety disorders whereas the stress sub-scale approximate criteria for GAD (T. A. Brown, Chorpita, Korotitsch, & Barlow, 1997; McDowell, 2006). The three factor structure of DASS-21 has been confirmed in clinical (T. A. Brown et al., 1997) and non-clinical samples (Henry & Crawford, 2005; Lovibond & Lovibond, 1995) and across different cultures (Norton, 2007). These studies show consistent convergent and divergent validity. DASS-21 also discriminates between anxiety and depression patients (T. A. Brown et al., 1997). Because there are few somatic items to confound measurement, DASS-21 is valid for chronic pain patients (Janotta, Scheman, & Covington, 2007; Parkitny et al., 2012).

Studies have confirmed the factor structure and validity of the measure in primary care and chronic pain patients aged over 60 years (Gloster et al., 2008; Wood, Nicholas, Blyth, Asghari, & Gibson, 2010). Both studies noted however, that the DASS-21 anxiety scale had low internal consistency with older adults (Gloster et al., 2008; Wood et al., 2010). The authors attributed this finding to the somatic content of the anxiety scale possibly mimicking somatic symptoms commonly experienced by non-anxious older adults. Wood and colleagues (2010) also noted that in their sample of chronic pain patients, completion rates fell significantly with age, especially in the group aged over 81 years.

In summary, the DASS-21 scale was selected as a measure of current mood because it is has a consistent factor structure and validity across different populations, appears suitable for older adults, has few somatic items and is shorter than comparable separate measures of anxiety and depression.

Health Anxiety and Body Perception Measures

Measurement considerations for the core constructs of interest in the current study were discussed in Chapter 5. To summarise, measures chosen for the present study were the Short Health Anxiety Inventory (SHAI, Salkovskis et al., 2002), Anxiety Sensitivity Index version 3 (ASI-3, Taylor et al., 2007), Body Vigilance Scale (BVS, Schmidt et al., 1997) and the Somatosensory Amplification Scale (SSAS, Barsky et al., 1990).

In order to provide a preliminary indication of the importance of arousal non-reactive symptoms in the prediction of health anxiety this study trailed a revised version of

the BVS (BVS-H). This revised version added questions to determine vigilance for sensations that are common in health anxiety. These additional items were selected after inspection of somatic symptom lists such as PHQ-15 (Kroenke, Spitzer, & Williams, 2002) and informed by the work of Walker and Furer (2008). This gave an additional six items; headache, fatigue, joint, limb or back pain, skin discolouration or rashes, stomach pain and gas or indigestion.

As discussed in Chapter 5, the body perception measures proposed for the study were untested in an older adult cohort. To allay concerns that the survey measures may be unsuitable for an older cohort and that the survey package may be overlong, a small trial study was carried out prior to the main data collection and this is described next.

Trial Survey

Survey packages were distributed to a convenience sample of older and younger adults. Older adults were recruited from a small town in New Zealand and the younger group were graduate students from a variety of locations across New Zealand. Participants were requested to complete the questionnaire, then provide comments on aspects of the questionnaire such as; time taken to complete the survey, layout and readability of the questionnaire, clarity of instructions, clarity of questions and whether any questions were difficult to answer.

Seventeen questionnaires were distributed (eight to adults over 65 and seven to graduate students under 30). Six older adults and four younger adults returned the package; all completed the questionnaire in full. None of this data was included in the final sample.

Results

Qualitative findings

Participants from both groups reported that the questionnaire was easy to answer and took approximately 25 minutes to complete. No comments were received about the body perception and health anxiety questionnaires. Some participants found the better/worse format of the "attitudes to aging" section did not give a sufficient range of answers, particularly the last question "*As I get older, things are (better /worse) than I thought they would be".* With regard to the SHAI-NC scale, there was a suggestion that asking whether the person had the illness that concerns them would be helpful to differentiate between actual and imagined feelings.

Quantitative findings

Ten participants returned the survey package. There were no missing data on any of the measures. Considering the participants as a single group, internal consistencies of and correlations between body perception and health anxiety measures were considered and are shown in Tables 2 and 3.

Table 2
Trial survey - Internal consistencies

Measure	Chronbach's alpha
SHAI	.846
ASI-3	.915
SSAS	.839
BVS	.223

SHAI = Short Health Anxiety Inventory; ASI-3 = Anxiety Sensitivity Index -3; SSAS = Somatosensory Amplification Scale; BVS = Body Vigilance Scale

Table 3
Trial survey - Measure correlations

	SHAI	ASI-3	SSAS	BVS
SHAI	_	.313	.240	.741*
ASI-3		_	.910**	.393
SSAS			_	.476

* significant at $p<.05$; ** significant at $p<.001$

Internal consistencies for the measures were comparable to those reported in previous studies (e.g. Barsky et al., 1990; Wheaton et al., 2010). The only exception to this was the BVS measure; however, this low figure was likely a spurious result because of the combined effects of a very small data set and the measure having only four items. Correlations between measures were in the expected directions and comparable to previous work (e.g. Wheaton et al., 2010). There are no available studies to compare SSAS and SHAI correlations. Of note was the very high correlation between ASI-3 and SSAS scores.

Discussion

The trial survey showed that the questionnaire package was acceptable to both groups and was not considered too long. The response rate among the younger group was disappointing, however the group were graduate students and the questionnaire was distributed at the same time as other academic deadlines were due, which likely affected response rate. More important, the older group did not report any difficulty with any of the measures in the questionnaire. The qualitative feedback was generally positive and the

two suggested additions to the questionnaire were straightforward to accommodate. In response to these concerns, the "attitudes to aging" question was modified to read "*As I get older, things are (better /same/worse) than I thought they would be"* a format previously used by Levy (2003). Second, an additional question was added after the SHAI-NC questions: *"When answering the questions 15 to 18 (above); have you already been diagnosed with the serious illness that you were thinking about? Yes/No"*

Quantitative analysis, although tentative, showed that measure internal consistencies and correlations were of similar magnitude to those reported in other work and thus gave confidence that measures used in the survey were appropriate for the proposed study. The high correlation between ASI-3 and SSAS scores implied that these instruments were measuring similar constructs, although this could be an artefact of the small data set. This was investigated further when the full data set was analysed.

In conclusion, data from this trial study did not raise any major concerns and after slight modifications to the questionnaire, the study data collection was commenced.

Method

Participants

Participants were adults aged 65 years and over and a comparison group of young adults 18-30 years. Recruitment was confined to the North Island of New Zealand. Planned recruitment in the South Island was abandoned because data collection commenced in the same week as the first Christchurch earthquake (September 2010), and it was considered that this might produce artificially high scores on the anxiety measures and confound the measures under study.

Group 1

This group were adults aged 65 years and older. In order to participate, respondents were required to be aged 65 and over and living independently (i.e. not in a nursing home or hospital). Recruitment of this group of participants was made by advertising in retirement communities, community organisations and personal contacts.

Of 365 anonymous quantitative self-report questionnaires distributed, 227 surveys were returned (approx 62% response rate). Of these six were blank leaving 221 usable responses (60.5% response rate). Seventy-one (32%) men and 148 (68%) women responded, with an age range of 65 to 97 years (mean 79.4 years). Almost all participants

(98%) were New Zealanders of European descent. Over half of the respondents (62%, n = 137) lived in Auckland and just over half (57.5%, n = 94) lived in retirement communities.

Group 2

Participants in this group were required to be aged between 18 and 30 years. Recruitment of this group was conducted through advertising to undergraduate lectures, email advertising and personal contacts.

Of 303 anonymous quantitative self-report questionnaires distributed, 181 were returned (59.7% response rate). Of these four were blank leaving 177 usable responses (58.4% response rate). Respondents were 112 (63.3%) women and 65 (36.7%) men, with an mean age of 22.9 years and age range of 18-30 years. A majority of participants (80%) were New Zealanders of European descent and 7.9% were other Caucasian, 5.6 % identified as Maori. Almost two-thirds (64.4%) lived in Auckland.

Measures

The survey package was named the *Reactions to Health and Illness* survey and is included in Appendix B 2. Measures used in the survey package are described below.

Health anxiety

Short Health Anxiety Inventory (SHAI, Salkovskis et al., 2002)[4]. The SHAI measure has two scales. The main scale (SHAI-IL) consists of 14 items measuring worry about health, feared consequences of having an illness and bodily sensations. The negative consequences (SHAI-NC) scale is independent of the main scale (Salkovskis et al., 2002), and consists of four items that measuring feared consequences of serious illness. Items are presented as separate statements and scored 0 (*no health anxious symptoms*) to 3 (*health anxious symptoms all of the time*). Chronbach's alpha for total SHAI scale for Group 1 was .83 and Group 2 was .80. For Group 1 SHAI-IL α = .83, SHAI-NC α = .6.

Demographic

Demographic information is important to give not only an indication of the representativeness of the sample population but also provide control for possible factors contributing to health anxiety. Included were age, gender, ethnicity, geographic location, education, marital status, occupation, whether the participant lived alone and (for the older group) whether they lived in a retirement community and subjective assessment of income

[4] Permission to use SHAI obtained from the scale author. Refer Appendix A for correspondence.

adequacy (income data was not collected as this has a high rate of non-response (Aday & Cornelius, 2006)).

Physical Health

RAND-36 General Health Scale (Hays et al., 1993). This measure of subjective health is a five item scale with questions such as "*I seem to get sick a little easier than other people*" and "*I am as healthy as anybody I know*", scored on a five point Likert scale: 0 (*definitely true*) to 4 (*definitely false*). Two of the five responses are reverse scored to compensate for response bias. Scores are transformed onto a 0-100 scale with higher scores representing better subjective health Internal consistency for the scale is greater than .8 (McDowell, 2006).

Physical illness. Participants indicated presence/absence of 22 diseases drawn from those used in the Massy University Health, Work and Retirement study (see http://hwr.massey.ac.nz/). In addition, participants were asked if they had been diagnosed in the previous six months and seen a specialist for any illness. An affirmative answer directed the participant to a series of questions about two such illnesses, and requested details of date of diagnosis, specialist visits and hospitalisation and subjective worry about the conditions.

Medical Outcomes Study Physical Functioning Scale (A. L. Stewart & Kamberg, 1992). This scale consists of 13 items; 10 items measure Activities of Daily Living (ADL), two items measure mobility and one item measures subjective satisfaction with physical capabilities. Responses on the ADL scale are *yes, limited a lot, yes, limited a little and no, not limited at all.* Scores are transformed onto a 0-100 scale; higher scores indicate better physical function.

The MOS Physical Function Measure has three scales, the first is a 10 item scale of physical function designed to cover areas of function that apply to most people, such as walking, lifting heavy objects, bathing and dressing (A. L. Stewart & Kamberg, 1992). The second scale has three questions measuring mobility as this was found to be related to well-being and relatively independent of physical capabilities. The third scale is a single question measuring subjective satisfaction with physical capabilities, included to discover the relationship between subjective and objective disability. Reported internal consistency in the development studies was .92 for the physical function scale and .71 for the mobility scale (A. L. Stewart & Kamberg, 1992). A Canadian study with older adults (mean age 73 years) with a slightly modified version of the physical function scale, reported internal

consistency of .92 (N = 1054) and test-retest reliability of .93 (N = 52) (Raina, Bonnet, Waltner-Toews, Woodward, & Abernathy, 1999).

Pain subscale of RAND-36 Short Form Health Survey (Hays et al., 1993). The pain scale has two items, measuring bodily pain and interference in daily activities over the past four weeks. Items are scored Likert scale scored *not at all*/*none* to *extremely/very severe*. Total score is the summation of the two items. Higher scores indicate less pain. Alpha coefficient for a population sample of older adults was reported as .88 (McDowell, 2006).

Psychological measures

Philadelphia Geriatric Morale Scale - Attitudes to Aging sub-scale (Lawton, 1975). As noted in the literature review, attitudes to aging may influence body awareness (Montepare, 2006; Poon & Knight, 2009) and health behaviours (Levy, 2003; Levy & Myers, 2004). To control for this possible confound Attitudes to Aging scale was included in the survey package. The five dichotomised items are scored one (*yes*) and zero (*no*). This is the most commonly used morale scale with older adults and has acceptable psychometric properties (Knight & Laidlaw, 2009).

Depression Anxiety and Stress Scale -21 (DASS-21, Lovibond & Lovibond, 1995). This 21 item scale measures depression, anxiety and stress over the previous week. Each subscale has seven items scored on a four point Likert scale scored 0 (*did not apply to me at all)* to 3 (*applied to me very much or most of the time*). Chronbach's alpha (total scale) for Group 1 was .91 and Group 2 was .90.

Body perception measures

Anxiety Sensitivity Index -3 (ASI-3, Taylor et al., 2007)[5]*.* This 18 item scale measures physical, cognitive and social factors of anxiety sensitivity on a five point Likert scale, scored 0 (*very little*) to 4 (*very much*). Each dimension has six items, typical items are: "*It scares me when my heart beats rapidly*" (physical dimension); "*When I cannot keep my mind on a task, I worry that I might be going crazy*" (cognitive dimension); and "*It is important for me not to appear nervous"* (social dimension). Chronbach's alpha (total scale) for Group 1 was .91 and Group 2 was .86. For Group 1, ASI-3 physical α = .83, ASI-3 cognitive α = .84 and ASI-3 social α = .77.

[5] Permission to use these scales obtained from the respective authors. Refer Appendix A for correspondence.

Body Vigilance Scale (BVS, Schmidt, Lerew, & Trakowski, 1997)[5]*.* This five item measure of attention to bodily cues consists of four questions scored on a 10 point Likert scale scored 0 (*none)* to 10 (*a lot*). The first three questions assess the attention and sensitivity to bodily sensations together with the average time spent attending to such sensations. The fourth question assesses the attention paid to a list of 15 sensations associated with panic, for example shortness of breath, faintness and health palpitations. Total score for the measure is the sum of rating on items 1-3 plus the average score over the 15 items of the fourth question. Chronbach's alpha for Groups 1 and 2 was .82.

BVS-H. As noted previously, six additional questions were added to the scale, assessing attention paid to the non-autonomic sensations of headache, skin problems, back pain, fatigue, stomach pain or indigestion. Scores on these six items were averaged and added to the total score of the BVS to give the BVS-H score. Chronbach's alpha for both groups was .82.

Somatosensory Amplification Scale (SSAS, Barsky, Wyshak, & Klerman, 1990)[5]*.* This 10 item scale measures amplification of innocuous bodily sensations. Typical items are: "*I am quick to sense hunger contractions in my stomach"* and "*Even something really minor like an insect bite or splinter really bothers me".* Items are scored 0 (*definitely true*) to 4 (*not true at all*) on a five point Likert scale. Chronbach's alpha for Group 1 was .74 and Group 2 was .70.

Procedure

Ethics approval for this study was received from Massey University Human Ethics Committee: Northern, Application 10/049. Survey information sheet and sample recruitment documentation are presented in Appendix B.

Group 1

The researcher made contact with the management of retirement communities requesting permission to advertise the study. Seven communities agreed to participate. At four villages, the researcher or research assistant presented the study at a community meeting and distributed questionnaires to those interested. At three further villages, the management arranged to advertise the study either by fliers or in their in-house newsletter that invited those interested to collect the questionnaire package from the office. A second avenue for recruitment was personal contact with individuals living in various North Island towns. These people agreed to distribute up to 10 questionnaires to their contacts. After

inspection of the distribution of responses, it was clear that there was a bias toward participants living in retirement communities in Auckland. In a second wave of recruitment, the researcher approached the organisers of two community groups in Auckland whose members generally did not live in retirement communities. The study aims were presented to a meeting and questionnaires distributed to interested parties.

Group 2

Undergraduate students at the Albany campus of Massey University were invited by the researcher to participate in the study; questionnaires were distributed at lectures to those interested in participating. Second, personal contact was made with several individuals living in various North Island towns who were sent up to 10 questionnaires to distribute to their contacts. A third avenue of recruitment was via postgraduate email lists at Massey University, care was taken to recruit participants from a wide range of disciplines. Finally, the study was advertised on a social network page. In these latter two instances, potential participants made initial contact with a research assistant and the questionnaire was mailed out to them. In a second wave of recruitment, efforts were made to increase the proportion of male participants.

Participants were supplied with an information sheet and paper and pencil questionnaire package, the information sheet detailed the aims of the study and provided information regarding confidentiality, anonymity and the use and storage of data. Participants completed the "*Reactions to Health and Illness*" survey package at home and returned it by post in a postage paid envelope supplied. Participants were free to send back the completed questionnaire at their own discretion; no follow-up was conducted. Informed consent was implied when the questionnaire was returned. No incentive for participation was offered.

The next section describes planned data analysis and related considerations for the present study.

Data Analysis

Analysis for the present study was carried out using *SPSS for Windows version 18.0* for group comparisons, regression analysis and exploratory factor analyses and *Mplus version 5* for confirmatory factor analyses.

Analysis I - Preliminary Study

Factor analysis was carried out for the health anxiety and body perception variables. This section outlines general considerations in factor analysis. Details of data analysis and data management procedures are described for each measure in Chapter 8.

Exploratory and Confirmatory Factor Analysis

Factor analysis of measurement instruments comprises either exploratory or confirmatory analyses; the choice of method rests on the purpose of the analysis (Brown, 2006). Exploratory factor analyses are used if the structure of the measure under consideration is not well established (T. A. Brown, 2006). Conversely, if the measure has a well-established facture structure then confirmatory methods are most appropriate (Byrne, 2010; T. A. Brown, 2006). Brown recommended that where sample sizes allow, both exploratory and confirmatory analyses be conducted to cross validate results.

Exploratory factor analysis

Commonly used methods for exploratory analyses are principal factor analysis (PFA) and principal component analysis (PCA). PFA is based on the common factor model, and makes no distributional assumptions (T. A. Brown, 2006). Principal component analysis (PCA) often gives equivalent results, but is not an exploratory factor analysis method (Brown, 2006). PCA does not account for shared variance between factors and overestimates the variance accounted for by the factors. For the current study, following recommendations by Brown, PFA was carried out with oblique (promax) rotation to provide a simple structure. Criteria for deciding the final factorial structure were; inspection of eigen values and scree plots, a minimum of three items per factor to increase interpretability and stability and theoretical coherence of the final structure (T. A. Brown, 2006).

Confirmatory factor analysis

Confirmatory factor analysis (CFA) is appropriate when the factor structure of a measure is well established (Byrne, 2010). Default estimation in CFA is normal Maximum Likelihood (ML), and rests on two assumptions; multivariate normality and that underlying

data are on a continuous interval-level scale. If variables show marked floor or ceiling effects, are excessively non normal, or ordered-categorical (ordinal), then the default ML estimator, should not be used and alternative estimation methods considered (Brown, 2006; Kline 2011).

There is considerable argument about when a scale might be considered continuous or discrete. A recent review of the literature concluded that for normally distributed data with four or more categories, assuming that the data is continuous will result in negligible error, providing the sample size is adequate (Byrne, 2010, 2012). Others argue that any scale with less than 15 categories will not approximate to a normal distribution, however between 5 and 10 points may be adequate (Kline, 2011).

An estimator that compensates for violations of scale continuity is the robust WLS estimator (called WLSMV in the *Mplus* programme) which analyses polychoric and polyserial correlations (Brown, 2006, Byrne, 2012). The WLSMV estimator performs well in simulation studies under diverse conditions (e.g. variable sample sizes, non-normality and model complexity), although may not provide reliable results for samples sizes under 200 (T. A. Brown, 2006; Flora & Curran, 2004). WLSMV is considered by some to be the best method currently available for estimation for ordered categorical data (Brown, 2006).

The assessment of the accuracy of a CFA model cannot be obtained from one statistic and there is a considerable literature giving values of fit indices that signify a 'well fitting' model (Kline, 2011). Brown (2006) suggests three types of fit indices should be considered, absolute (e.g. chi square), parsimony (e.g. RMSEA) and comparative (e.g. CFI/TLI). Although cut-off values may not always be reliable consideration of each of these types of index will increase confidence in the accuracy of the model (Kline, 2011). Model fit indices adopted for the current study are presented in Table 4.

Table 4
Model fit indices

Measure	Interpretation	Suggested cut off scores*
Chi square (χ^2)	χ^2 is the most commonly reported statistic (Brown, 2006). This index is unsuitable as the sole indicator of fit because it is adversely affected by sample size (e.g. inflated when sample size is large), non-normality of data (violates the statistical assumptions) and is based on a stringent hypothesis of exact fit.	Non significant values signify good fit, however unreliable if the sample size is large. Kline (2011) suggests that when sample size is less than 300 significant χ^2 indicates noteworthy problems with the model.
Comparative fit index (CFI)	The CFI evaluates relative improvement of the hypothesised model against a null model (Kline, 2011).	≥ .95
Tucker Lewis Index (TLI)	TLI compares the degrees of freedom for baseline and hypothesised model (Kline, 2011).	≥ .96
Root Mean Square Error of Approximation (RMSEA)	Based on the non-central chi square distribution. RMSEA calculates how reasonable fit is to the population, accounts for complexity of model and is relatively insensitive to sample size (Brown 2006).	≤ .05 good fit, .05 < .08 moderate fit >.1 inadequate model
Weighted Root Mean Square Residual (WRMR)	Calculated from differences between the sample and estimated population variances and covariances, and Is suitable for non-normal and categorical data (Yu, 2002).	0.95 - 1.00

*based on Yu, (2002) and Hu & Bentler, (1999)

Analysis II - Principal Study

Analyses for the principal study comprised within group and between group comparisons, and regression analyses.

Group comparisons.

Group comparisons comprised within group and between group analyses.

Within group. An initial series of tests were carried out to compute statistical differences on demographic, physical health and mental health variables for four conditions: age, gender, location, and for the older group, comparing those living in a retirement community or not. To facilitate these comparisons, three demographic factors were dichotomised as follows. A majority of participants were from Auckland, therefore, to

investigate whether participants from Auckland differ in any statistically significant way from those not in Auckland location was dichotomised into those living in Auckland and those living elsewhere. Qualification was divided into tertiary and trade qualifications versus secondary and no qualification. Income was divided into those with not enough and just enough income versus those with enough and more than enough.

Between groups. Statistical differences between Group 1 and Group 2 were calculated for gender, location, physical health, health anxiety and body perception variables.

In all group comparison testing, to compensate for non-normality, non-parametric tests were carried out with missing data excluded. To ensure that results were robust, these analyses were repeated with missing data imputation as provided in the *SPSS* programme. Independent *t*-tests were carried out with and without missing data. Any differences in these results were reported.

Multivariate regression

Multivariate regression assesses the relationship between one dependent variable (DV) and several independent variables (IV, Tabachnick & Fidel, 2007). There are three types of regression analysis, *Sequential (hierarchical) regression, Standard multiple regression and Statistical (stepwise) regression* (Tabachnick & Fidel, 2007). Standard and statistical regression methods were not considered, as outcomes depend on statistical rather than theoretical considerations (Kline, 2011). Hierarchical regression is based on theory and IVs are entered in a sequence determined by researcher. 'Nuisance' variables are entered first to control for common factors that may contribute to the DV.

In the present study, hierarchical regression was performed to evaluate the influence of the body perception variables (anxiety sensitivity, body vigilance, somatosensory amplification) in the prediction of health anxiety. To control for other factors that may contribute to this relationship, control variables were entered in blocks, as follows; demographic variables, physical health variables, attitude to aging (for Group 1 only), current depression and anxiety, and then finally the body perception variable(s) of interest. For each group, a series of regression analyses were planned. With SHAI-IL as DV, three models were tested. For *Model 1,* ASI-3, BVS and SSAS were entered simultaneously. *Model 2*, ASI-3 and BVS. Finally, *Model 3* examined SSAS as a predictor. Finally, Model 1 was re-examined with SHAI NC scale as DV.

Group Comparisons and Regression Data Management

Missing data

Tabachnick and Fidel (2007) suggest that any missing data in excess of 5% has detrimental effects on the results and that replacement of missing values should be considered. The review by Tabachnick and Fidel suggests that Multiple Imputation is the preferred method of assigning values to missing data points; on the other hand, if missingness is under 5% then any missing data strategy would give similar results. The percentage of missing data was checked for each variable in turn and those with less than 5% missing data points were assigned the mean values across the variable (Kline, 2011, Tabachnick & Fidel, 2007). Where missing data exceeded 5% then preliminary analyses were conducted with mean substitution and multiple imputation and any differences reported.

Group 1. Three respondents did not complete demographic questions, however completed the remainder of the questionnaire, so were retained in the analysis. Most missing data occurred in 'attitude to aging' measure (N= 179) and ASI-3 measure (N=204). Initial missing data analysis suggested that the missing was either Missing Completely at Random (MCAR) or Missing at Random (MAR). Missing data strategies for each set of variables is given below.

Demographic and physical health measures. Missing data on these measures was generally less than five cases (<2%) therefore missing data points were replaced by the mean or median value, as appropriate.

Psychological and body perception measures. ASI-3, SHAI and attitude to aging measures had greater than four percent missing data (see Appendix C 2). Dummy variables were computed for missing and non-missing data for ASI-3. T-tests showed that those recording no response were significantly older (mean age 83.5) than those who completed the questionnaire (mean age 79, t = 2.799, ρ = .006). There were no significant differences found for any other variable. Missing data for attitude to aging was not significantly related to any variable. Preliminary regression analysis was carried out in three steps: step 1: physical function, pain, number of physical illnesses; step 2: DASS-21 scores; step 3: SSAS, BVS and ASI-3 scores. Although each analysis gave slightly different numerical results (differences in R^2 of approximately 7%), overall the various combinations of strategies lead to the same conclusions. In the interests of parsimony, the final analyses were carried out with mean substitution. If any predictors almost reached significance, then these

regression analyses were re-computed using multiple imputation to replace missing values with any differences in results reported.

Group 2. Missing data was limited to one or two data points on the physical health and psychological measures and mean substitution was carried out prior to hypothesis testing.

Normality

Univariate and multivariate normality are key requirements for regression and factor analyses. Ideally values of skew and kurtosis should be close to zero (Tabachnick & Fidell, 2007; Thompson, 2004), however this is not often achieved in practice. Some writers suggest that values of skew greater than three and kurtosis greater than seven are potentially problematic (Kline, 2011). Univariate outliers were identified by inspecting box plots and *z* scores ≤ 3.29 (ρ<.001) (Kline, 2011; Tabachnick & Fidell, 2007). Multivariate outliers were identified by running dummy regression analyses and generating Cook's distance and Mahalanobis distance scores. A guideline by Mcdonald (2002) suggests that Cook's distance <.7 means that the case is not unduly influential in the analysis. Alternatively, a conservative estimate of the influence of a potential multivariate outlier is to apply the χ^2 test with ρ <.001 (Tabachnick & Fidell, 2007). Remedies for multivariate outliers are; conversion of the score to the next most extreme value, removal from the data set and transformation (Kline, 2007; Tabachnick & Fidel, 2007). For the current study, changing the score to the next most extreme value was adopted to retain the sample size.

Group 1. Inspection of raw data descriptive statistics (Appendix D 1) showed ASI-3, and DASS-21 measures had statistically significant skew and kurtosis. Inspection of variables with large z scores and box plots showed one or two outliers on the DASS-21 and ASI-3 measures. Dummy regression and inspection of Mahalanobis and Cook's distances, showed Cook's distance were all <.7 (Mcdonald, 2002). Applying the critical χ^2 test (Tabachnick & Fidell, 2007), revealed two potential multivariate outliers. These outliers were recoded and retained in the analysis.

Group 2. Inspection of raw data descriptive statistics (see Appendix D 7) showed physical illness, pain, ASI-3, SHAI and DASS-21 measures had statistically significant skew and kurtosis. Physical function had high skew/kurtosis as 87% of participants scored over 95 on this measure. Almost all participants (99.4%, N= 176) scored 100% on the mobility measure. Inspection of box plots and variables with large z scores showed one or two

outliers on the physical illness, pain, DASS-21 and ASI-3 measures. These outlier cases were assigned the next largest score for that variable. Tests described above revealed one potential multivariate outlier across the regression analyses inspected. The Mahalanobis distance was not extreme for this variable and was therefore retained in the final data set.

Excluded Variables

Group 1. All participants reported at least one illness lasting for 6 months or more, therefore this measure of chronicity was removed from further analysis. Similarly, a majority of participants (80.5%) had no limitations on mobility, and a further 8.6% were slightly limited. This bias towards high levels of mobility among participants limited the usefulness of this measure and it was deleted from the analysis. After answering the SHAI negative consequences scale, participants were asked to answer a yes/no question: "*Have you already been diagnosed with the serious illness that you were thinking about?"* There was no significant difference between positive and negative responses to this question for SHAI NC scale scores, and this measure was excluded from the analysis.

Group 2. Greater than 90% of participants had no difficulty with physical function or mobility; therefore, these variables were excluded from the analysis. There was no significant relationship between SHAI-NC scale and the probe question ("*Have you already been diagnosed with the serious illness you have been thinking about?"),* and responses to this question were not considered further. Attitudes to aging was not considered as this measure was not designed for young adults

Analysis III – Evaluation of BVS-H measure

Evaluation of the modified BVS measure was carried out for both groups in two stages. First exploratory factor analysis as described in Analysis I and comparison made with the original BVS. Second, regression analysis as described in Analysis II was carried out with BVS-H and ASI-3 as dependent variables. These results were then compared with those obtained in Analysis II. Data management was as described previously for Analyses I and II.

CHAPTER 8 - ANALYSIS I - PRELIMINARY STUDY

FACTOR ANALYSIS OF SELECTED MEASURES

"Anyone who stops learning is old, whether at 20 or 80. Anyone who keeps learning stays young. The greatest thing in life is to keep your mind young."

Henry Ford

This section gives factor analyses for SHAI, ASI-3, SSAS and BVS measures. The overall purpose of these analyses was to examine the factor structure of each measure in the older adult cohort and compare this to previous findings. Each measure is considered in separate sub sections. For each sub-section first a brief introduction is given, then data management and data analyses for the current study described. This is followed by analysis of data. The sub-sections conclude with a discussion and summary of findings.

SHAI Factor Analysis

As discussed in Chapter 5, there are no published exploratory factor analyses for the SHAI for an older population and apparent differences in factor structure may be a function of the different populations (Byrne, 2010). In accordance with recommendations by Brown (2006) an exploratory factor analysis was carried out on the data set from the study by Boston and Merrick (2010), then cross-validated with a confirmatory analysis using *Mplus version 5* on data from the current study.

Exploratory factor analysis

As part of a prior study of health anxiety in an older population (Boston & Merrick, 2010), data was collected from a New Zealand population of 148 adults aged over 65 years. Permission was obtained from Massey University (Northern) Ethics Committee to re-examine data pertaining to the SHAI measure to determine usefulness of the SHAI as a measure of health anxiety in an older population.

Data cleanup. Of the 148 responses returned, nine participants did not provide responses to more than six items on SHAI, and were excluded from the analysis. A further 19 had not provided responses to single items. After inspection, these were replaced by zero or one depending on the mean for the item and participant responses to similar items, leaving N = 139. Inspection of data showed skew and kurtosis greater than ±1 implying non-normal distributions on some items, item 5 had the highest kurtosis with a value of approximately nine.

Data analysis. Data were analysed using principal factor analysis with promax rotation.

Results and discussion. Results are summarised in Table 5. Inspection of initial results showed that although a four-factor solution was favoured this was not considered parsimonious as two factors had less than three items. Based on initial criterion of |.32|as a salient loading, 3-factor solution was favoured however, as in prior studies (see Appendix E 1); there were some differences in the composition of the factors, and items 5 and 11 cross-loaded. A consistent feature was that the last four items loaded onto one factor similar to results reported previously (Abramowitz, Deacon, et al., 2007; Kowalyk & Hadjistavropoulos, 2007; Wheaton, Berman, Franklin, et al., 2010).

Table 5

SHAI EFA results, Boston and Merrick (2010) data

Item no	Factor / Content	A	NC	B
1	Worry about health	**.540**	-.130	.200
2	Noticing aches and pains	**.603**	-.121	-.078
3	Awareness of bodily sensations or changes	**.719**	.006	-.128
4	Ability to resist thoughts of illness	**.720**	.045	.017
5	Fear of having a serious illness	***.322***	-.088	**.545**
6	Picturing self being ill	**.395**	.036	.379
7	Ability to take mind off health thoughts	**.569**	.081	.147
8	Relieved if doctor says nothing wrong	-.010	.061	**.716**
9	Hear about illness and think I have it	.132	.088	**.344**
10	Wonder what bodily sensations/changes mean	**.477**	.000	.138
11	Feeling at risk for developing illness	-.073	***.331***	**.536**
12	Think I have serious illness	-.071	-.083	**.874**
13	Think of other things if I notice unexplained body sensations	**.574**	.219	-.134
14	Family/friend say I worry about my health	**.372**	-.043	.051
15	Ability to enjoy life if I have a serious illness	.038	**.731**	.002
16	Chance of medical cure if have a serious illness	-.273	**.578**	.241
17	Serious illness would ruin aspects of life	.042	**.758**	-.028
18	Loss of dignity if had a serious illness	.090	**.716**	-.130

Confirmatory factor analysis

Data cleanup. Data from the current study were inspected for missing data and multivariate normality (see Appendix C 1). Inspection of data showed that of 221 usable responses received, six gave no response on SHAI measure, leaving N = 215. Missing data

was less than 3% and no missing data strategy was implemented and final N (listwise) was 202.

***Data analysis*.** Following the argument of Wheaton and colleagues (2010) responses were considered ordinal for the SHAI because; there are less than five responses (see previous discussion) and responses do not follow the usual format for a Likert scale. Analysis was carried out using *Mplus version 5* using the diagonally weighted least squares estimator (WLSMV) from the polychoric correlation matrix. Three models were tested; a single factor, two factors consisting of the first 14 items as the first factor and the last four as second and lastly, a 3-factor model based on the EFA of the Boston and Merrick (2010) data described above. Post hoc exploratory model fitting was then carried out to determine whether any modification to the model would improve model fit statistics.

Sample size and power. Initial sample size calculations in Chapter 7 were based on normal distribution assumptions. The sample size and power calculation from MacCullum and colleagues (1996) is suitable for methods other than ML estimation, providing statistical assumptions for the estimation method are met. WLSMV estimation gives d*f* value of 58, using this value and sample size of 202, power of analysis is .82, which is acceptable.

Results. In all cases, chi square was significant, which given the moderate sample, suggests some inadequacies in the models tested (Kline, 2011). A summary of fit indices are presented in Table 6. Parameter estimates are presented in Appendix C 3. Fit indices indicated that the 2-factor model is likely the most parsimonious and provides an adequate fit to the model. Inspection of the modification indices, shows that allowing error variance for items 5 and 12 to covary may give a better fitting model. These items are very similar in content – items 5 is "*fearing that I have a serious illness*" and item 12 is "*thinking that I have a serious illness*", therefore it may be theoretically justified to allow error to covary. Post hoc model fitting, allowing the error variances between items 5 and 12 to covary gave a slight improvement on fit indices.

Table 6

SHAI CFA Fit indices summary table

Fit index	One factor	2 factor		3 factor †
			with s12 cov s5	
χ^2	157.449	119.708	113.307	117.478
ρ	.000	.000	.000	.000
CFI	.902	.940 (.97)‡	.955	.937
TLI	.931	.958 (.94)	.967	.958
RMSEA	.091	.07 (.07)	.073	.074
WRMR	1.128	.973 (1.0)	.955	.957

Note:

†from Boston and Merrick (2010) data

‡ fit indices in brackets reported by Wheaton et al., (2010)

Cross validation analysis

In light of the relatively small sample sizes reported above, a further cross-validation analysis was carried out with the combined data sets, giving N = 354. Inspection of skew and kurtosis showed moderate non-normality and N (listwise) = 341 (see Appendix C 2).

The combined data set was used for a CFA using *Mplus* WLSMV estimator. The two factor solution gave χ^2 175.461 (d*f* 62) ρ <.001. CFI = .957, TLI = .972, RMSEA = .072 and WRMR = 1.075. A three factor solution χ^2 181.793 (d*f* 58) ρ <.001, CFI = .952, TLI = .968, RMSEA = .078, WRMR = 1.082. These fit statistics suggest that similar to the previous analysis, a 2-factor solution is most parsimonious.

In conclusion, similar to previous analyses (e.g. Wheaton et al., 2010), the first 14 items were best represented by a single factor, which for the remainder of this study is called the illness likelihood scale (SHAI-IL). The final four items represent a single factor, called the 'negative consequences' (SHAI-NC) scale (Salkovskis et al., 2002).

ASI-3 Confirmatory Factor Analysis

The three factor structure of ASI-3 has been validated in clinical and non-clinical populations and in several languages (Escocard et al., 2009; Kemper et al., 2009; Osman et al., 2010; Sandin et al., 2007; Taylor et al., 2007; Wheaton et al., 2012); however, the factor structure has not been tested in adults over 65. This analysis will provide preliminary evidence of the three factor structure of ASI-3 measure in adults over 65.

Data cleanup. Inspection of data showed that of 220 usable responses received, seven gave no response on ASI-3 measure, a further seven participants had more than 10 missing data points. These 14 participants were deleted from the analysis, leaving N = 206.

Percentage of missing data in the remaining dataset was low, therefore listwise deletion was implemented and final N = 200. Inspection of skew, kurtosis (see Appendix C 4) and histograms indicated that most items were not univariate normal (and therefore not multivariate normal) and the assumptions of ML estimation were not satisfied. Further, between 40% and 80% of responses were zero on each item, indicating likely floor effects. This, combined with non-normality argued against using the MLM estimator (Brown, 2006).

Data analysis. Development studies and at least one prior validation study (Taylor et al., 2007; Wheaton et al., 2012) have assumed that item responses are not continuous because the Likert scale has only five response options. Given this prior work, and the non-normal data set here, then confirmatory factor analysis was carried out with *Mplus version 5* using the diagonally weighted least squares estimator (WLSMV) from the polychoric correlation matrix. Following prior work by Taylor and colleagues (2007) and Wheaton and colleagues (2012), three models were tested. First, a three-factor model, comprising the social, physical and cognitive factors; then a two-factor model comprising a physical and a combined social/cognitive factor; and finally a single factor model.

Sample size and power. Initial sample size calculations were based on normal distribution assumptions. Power calculations using recommendations from MacCullum and colleagues (1996) for sample size of 200, d*f* 45 and α .05, gave power of .73 which is adequate.

Results. Results are summarised in Table 7. In all cases, chi square was significant. Results for the two and three factor models indicate cross loading between the social factor and item 15 ("*when my throat feels tight I worry that I might choke to death*"), however there does not appear to be a sufficient theoretical justification for cross loading this onto the social factor. In order to investigate this further, another two factor model was tested, with the cognitive factor and a combined social/physical factor. All chi square values were significant. Fit indices for the one and two factor models did not reach acceptable levels. CFI/TLI values reached acceptable levels for the three-factor model. RMSEA values indicated mediocre fit and WRMR was less than 0.95. These results indicate that the three factor model provides a less than optimum explanation of the factor structure of ASI-3 for this population. Standardised parameter estimates are provided in Appendix C 5.

Table 7

ASI-3 - Comparison between models and prior work

	One factor		Two factor phys and cogsoc		Two factor cog & socphy	Three factor – phys, soc, cog	
	Current study	Wheaton et al., 2012	Current study	Wheaton et al., 2012	Current study	Current study	Wheaton et al., 2012
χ^2	225.689		177.929		143.493	121.459	
d*f*	45**		45**		46**	45**	
ρ	0.0000	0.000	0.000	0.000	0.000	0.000	0.000
CFI	0.887	.923	0.917	.949	.939	**0.952**	.968
TLI	0.950	.913	0.963	.941	0.973	**0.979**	.963
RMSEA	0.140	.116	0.120	.095	.101	**0.091**	.075
WRMR	1.291		1.143		1.010	**0.927**	

Body Vigilance Scale Factor Analysis

As outlined in Chapter 5, there is limited information regarding the factor structure of the BVS measure therefore, this investigation was considered exploratory in nature. An exploratory factor analysis was carried out using principal factor analysis (PFA). Criteria for deciding the final factorial structure were inspection of eigen values and scree plots, a minimum number three items per factor and theoretical coherence of the final structure.

Data cleanup. Three of the 221 participants, had left the BVS question blank and were removed from the analysis, leaving N = 218. Incomplete responses on some items left N (listwise) = 216. Missing data was <1% and no missing data strategy was implemented.

Results. Based on eigen vales <1.0, EFA produced a single factor model accounting for 57% of variance, see Table 8.

Table 8

BVS - Group 1 – Exploratory factor analysis, factor loadings

Item number	Factor loading
Item 1	.900
Item 2	.946
Item 3	.541
Item 4	.534

Somatosensory Amplification Scale Factor Analysis

As shown in Chapter 5, there are no reported studies of the factor structure in English speaking populations and available studies do not give consistent results, the current study is therefore considered exploratory. An exploratory factor analysis for the older adult group was carried out using principal factor analysis (PFA). As previously, criteria for deciding the final factorial structure were inspection of eigen values and scree plots, three items per factor and theoretical coherence of the final structure.

Data cleanup. Of 221 responses in the original dataset, four participants had not completed the SSAS, leaving N = 217, of these there was less than 1% missing data and listwise deletion gave N = 214. No missing data strategy was implemented. Inspection of univariate normality showed that items four and nine were significantly non-normal (see Appendix C 6).

Results. Initial analysis gave a three-factor solution, accounting for 35% variance. Examination of item distributions showed a number of aspects of concern. Specifically, Eigen values were just above one (1.08 and 1.02) for two factors and these factors had three or less items and some items did not load on any factor (i.e. had factor loadings less than .3). Inspection of the scree plot confirmed that one or two factor solutions were likely more parsimonious.

Two further analyses were carried out constraining the number of factors to two, then one factor. The two-factor solution did not give a theoretically coherent or interpretable result, with items three and six cross loading. The two-factor solution was discarded in favour of a single factor structure (see Table 9). All loadings are greater than .32 and this solution accounted for 24% of variance.

Table 9

SSAS - Group 1 – Exploratory factor analysis, loadings for single factor model

Item	Factor
I can't stand smoke, smog or pollutants in the air	.366
I am often aware of various things happening within my body	.490
When I bruise myself it stays noticeable for a long time	.412
I can sometimes feel the blood flowing in my body	.459
Sudden loud noises really bother me	.548
I can sometimes hear my pulse or my heartbeat throbbing in my ear	.505
I hate to be too hot or too cold	.509
I am quick to sense hunger contractions in my stomach	.500
Even something really minor like an insect bite or splinter really bothers me	.620
I can't stand pain	.428

CHAPTER 9 - ANALYSIS II - PRINCIPAL STUDY

DESCRIPTIVE STATISTICS AND REGRESSION ANALYSES

"There are three kinds of lies: lies, damned lies and statistics."
Mark Twain

This chapter gives descriptive and regression analysis results for Groups 1 and 2. First, demographic statistics are given for both groups and comparisons made. Descriptive statistics, within group statistics and correlations are given for each group then between group statistics follow. Finally, results of regression analyses for both groups are presented.

Descriptive Statistics

Group 1

Demographic.

Demographic characteristics are summarised in Table 10. Thirteen people worked full or part time, the remainder (93.7%) were retired. Approximately two thirds (n = 149) of participants reported that their income was enough or more than enough. Comparison between the demographic characteristics of the study and Statistics New Zealand data (http://www.stats.govt.nz/), show that the cohort was not representative, in particular the cohort did not reflect the ethnic and socio-economic diversity of the North Island of New Zealand.

Physical health.

Measures of medical morbidity were number, type, severity and chronicity of physical illness, which illnesses had required hospitalisation in the previous 12 months and the subjective worry about these illnesses. Further physical health measures were; physical function, pain, mobility, satisfaction with physical function and subjective health.

The median number of illnesses was three (range 0-12) with 11 (5%) participants reporting no physical illness. Inspection of Appendix D 5 shows that the most frequently reported conditions were hypertension, arthritis, hearing impairment and cardiac problems. Fourteen (6%) participants reported hospitalisation in the previous 12 months and had an average stay of 8.4 days. Mean physical function score was 60.93 (*SD* = 26.94) and mean pain score was 70.99 (*SD* = 25.42). Mean subjective health score was 65.19 (*SD* =

19.04) and mean satisfaction with physical capabilities score was 59.2 (*SD* = 22.23). Full data is given in Appendix C 1. Inspection of norms from Mchorney, Kosinski and Ware (1994) for a US population of over 65s, indicate that the cohort in the current study had similar physical function, less pain and had better subjective health than the comparison group.

Table 10
Groups 1 and 2 - Demographic characteristics

Characteristic		Group 1 (N = 221)		Group 2 (N = 177)		Significance
		N	%	N	%	χ^2
Gender	Women	148	68	112	63.3	Ns
	Men	71	32	65	36.7	Ns
Retirement village	No	94	42.5	N/A		
	Yes	127	57.5	N/A		
Marital status	Married/defacto	113	51.1	51	28.8	
	Separated	13	5.9	0	0	
	Widow/Widower	90	40.7	0	0	
	Never married	5	2.3	126	71.2	
Qualification	No qualifications	37	16.7	1	.6	
	Secondary school	67	30.3	74	41.8	
	Trade	43	19.5	9	5.1	
	Degree	73	33.0	93	52.5	
	Other	1	.5	0	0	
Student	No	N/A		63	35.6	
	Yes	N/A		114	64.4	
Auckland	No	84	38.0	63	35.6	ns
	Yes	137	62.0	114	64.4	
Income satisfaction	Income not enough	21	9.5	40	22.6	
	Income just enough	51	23.1	65	36.7	
	Income enough	111	50.2	54	30.5	
	Income more than enough	38	17.2	18	10.2	

Psychological measures.

Mean psychological measure scores are given in Table 11. Prior studies have suggested that scores above 15 on the SHAI measure denote high health anxiety and those above 18, severe health anxiety (Rode et al., 2006). Fifteen participants had scores greater than or equal to 15 and six scored 18 or above. Likewise, suggested DASS-21 cut-off scores

are given in Appendix E 2. Ninety percent of participants scored in the normal range on all scales of DASS-21, with six (2.7%) scoring in the severe range for anxiety, four (2%) for depression and two (0.9%) for stress.

Table 11

Groups 1 and 2 - Physical health and psychological measures; mean scores and significance tests.

	Mean and standard deviation‡		Significance test
	Group 1 (65+)	Group 2 (18-30)	*t*
General health	65.19 (19.04)	71.11 (18.45)	-3.06**
Pain	70.99 (25.42)	81.29 (17.07)	-4.60**
Physical illness	3.66 (2.30)	1.06 (1.19)	13.65**
SSAS	23.90 (6.92)	25.77 (6.14)	-2.80**
BVS-H	14.84 (8.62)	22.26 (8.91)	-8.31**
BVS	11.96 (7.61)	17.70 (7.602)	-7.40**
ASI-3 total	10.67 (10.13)	14.90 (10.14)	-4.06**
ASI-3 physical	3.80 (3.93)	4.16 (3.90)	-.88
ASI-3 cognitive	2.81 (3.44)	2.66 (3.64)	.40
ASI-3 social	4.02 (4.02)	8.08 (5.07)	-8.69**
SHAI total	9.32 (5.35)	12.02 (5.40)	-4.90**
SHAI- IL	7. 20 (4.46)	9.28 (4.82)	-4.42**
SHAI NC	2.11 (1.68)	2.71 (1.82)	-3.41**
DASS-21 Anxiety	3.38 (4.39)	4.66 (5.24)	-2.62**
DASS-21 Depression	4.20 (5.50)	6.43 (7.03)	-3.52**
DASS-21 Stress	5. 61 (5.95)	11.05 (8.83)	-7.23**

SSAS = Somatosensory Amplification Scale, BVS = Body Vigilance Scale, BVS-H = modified body vigilance scale, ASI-3 = Anxiety Sensitivity Index -3, SHAI = Short Health Anxiety Inventory, SHAI-IL = Short Health Anxiety Inventory Illness likelihood scale, SHAI-NC = Short Health Anxiety Inventory Negative Consequences scale, DASS-21 = Depression Anxiety and Stress Scale -21

‡SD in brackets

** p <.001

Group 1 - Demographic Comparisons

Gender. There were no significant differences in age between men and women (t = 1.465, df = 219, ρ =.144). Women reported poorer physical function (t = 2.545, df =217, ρ = .012) and more pain (t = 2.769, df = 216, ρ = .006) than men. There were no significant differences between men and women on any of the mental health measures, attitude to aging, subjective health or satisfaction with physical capabilities. Chi square testing showed

no differences between men and women on demographic factors, except that women reported significantly lower qualifications and were more likely to be living alone than men. A summary is given in Appendix D 3.

Location (Auckland/not Auckland). Participants from Auckland were significantly older than those from outside Auckland (t= -2.1, df 219, ρ =.037). Chi square testing showed no significant differences between Aucklanders and non-Aucklanders in income satisfaction, qualification nor were they more likely to be living alone. Aucklanders were however significantly more likely to be living in a retirement community; a summary is given in Appendix D 4. T-tests showed no significant differences between participants that lived in Auckland and those that did not on any physical health measures or mental health measures. Because of non-normal distributions for the ASI-3 and DASS-21 measures, non-parametric tests were examined for these measures. These gave the same results except that at ρ = .05, participants from Auckland (mean = 3.95, SD = 4.97) reported significantly higher anxiety scores than non- Aucklanders (mean = 2.72, SD = 4.54, ρ = .022).

Retirement community. Participants who lived in a retirement village had a mean age of 81.8 years and were significantly older than participants living in the wider community, mean age 76.3 (t =-7.004, df = 219, ρ <.001). Retirement village residents were more likely to live in Auckland and live alone (χ^2 4.182, df = 1, ρ = .041). There were no significant differences in gender or income between the two groups. Retirement village residents had generally significantly poorer health than those living in the community; however, there was no significant difference in pain between the two groups. Retirement village residents had more pessimistic attitudes to aging, lower physical function, poorer subjective health, a greater number of reported illnesses and lower mobility. T tests and non-parametric tests showed that living in a retirement village had no statistically significant impact on scores on any psychological measure.

Correlations

Correlations between measures were inspected next (see Appendix D 6) to ensure that correlations were in the expected directions, independence of the variables and that there were no issues of multicollinearity. Finally, correlations between specific measures were inspected to inform the choice of variables in the regression analysis.

All correlations were in the expected direction. Following the findings of the pilot study that ASI-3 and SSAS scores were highly correlated total ASI-3 and SSAS score

correlations were inspected. Correlation was .30 indicating that the instruments were not measuring the same construct. All correlations between the SHAI measures and independent variables were less than .80 indicating no multicollinearity between measures (Tabachnick & Fidel, 2007). Attitude to aging had low but significant correlation with all anxiety measures, age and physical health measures. This implied that it was an important attitudinal measure and should not be ignored in the regression analysis. Correlation between the number of physical illnesses and accumulative SIRS scores was .95 indicating that these measures were almost equivalent.

Age had low to moderate correlations with physical function and number of physical illnesses. There were negligible correlations between age and pain. Increasing age was significantly associated with poorer physical health, but not with increased pain. SHAI-IL scale had moderate and significant correlations with all measures of physical health. SHAI-NC scale had low correlations with all health indicators, of particular note; the correlation with number of physical illnesses was very weak.

Descriptive Statistics

Group 2

Demographic statistics

A summary of demographic statistics is given in Table 10.

Physical health

Approximately half (N = 90, 50.8%) of participants in Group 2 reported at least one chronic illness, the median number of illness reported was one (range 0-6). The most commonly reported medical conditions were asthma (N = 50), skin conditions (N = 22) and depression or anxiety (N = 21; it should be noted however, that this was not a measure of current mood or anxiety disorder). Eighteen (10%) participants reported at least one serious illness (cancer, diabetes, epilepsy, heart problems, respiratory conditions and stroke). As noted above, almost all participants reported no limitation on physical function or mobility. Frequency tables are presented in Appendix D.9. Mean pain score was 81.3 (*SD* = 17.07) and mean subjective health score was 71.1 (*SD* = 18.45). Summary scores are shown in Table 11. Comparison with norm tables from Mchorney and colleagues (1994) suggests that the current cohort had higher physical function, similar pain and lower subjective health than the comparison group.

Psychological measures

Summary scores for all psychological measures are in Table 11. Prior studies have suggested that scores above 15 on the SHAI-IL measure denote high health anxiety and those above 18, severe health anxiety (Rode et al., 2006). Twenty-four participants (13.6%) scored 15 and over and 12 (10%) scored 18 and over. Similarly, the developers of DASS-21 suggest a range of cut off scores (see Appendix E 2). Group 2 anxiety scores, showed 81% were in the normal range, with 12 (6.8%) in the severe/extremely severe range. Seventy-five percent had depression scores in the normal range and 11 (6.2%) in the severe/extremely severe range. Finally, 73% were in the normal range of stress and 13 (7.3%) in the severe/extremely severe range.

Demographic Comparisons

Comparisons were carried out for three conditions: gender, location and whether being a student had any statistically significant effect on demographic factors, physical health and psychological measures. To facilitate these comparisons, three demographic factors were dichotomised as described previously. To allow for non-normal data, Mann Whitney tests are reported.

Gender. There were no statistically significant differences on any demographic measures across gender. Women reported more pain (ρ = .003) and physical illness (ρ = .028) than men, but no differences in subjective health. There were significant differences for gender on SSAS (ρ <.001), BVS (ρ < .001), SHAI-IL (ρ = .016) and DASS-stress (ρ = .004), with women reporting significantly higher scores on each of these measures.

Location (Auckland/not Auckland). There were no significant demographic differences between Aucklanders and non-Aucklanders, except that those living in Auckland were significantly younger (ρ = .002). Location did not significantly affect physical health status or scores on the psychological measures.

Student. Students were not significantly different to non-students on the demographic measures, excepting that students were younger than non-students (ρ <.001). There were no significant differences between the two groups on all physical health measures. Students had significantly higher scores on the SSAS (ρ =.024), ASI-3 social concerns (ρ = .002), SHAI-IL (ρ =.031) and DASS-21 anxiety (ρ = .024) and depression (ρ = .009) scales.

Correlations

Correlations between measures are given in Appendix D 8. Except for DASS-21 anxiety, age was not significantly correlated with physical health or psychological measures. Pain was significantly correlated with subjective health, physical illness, ASI-3 cognitive concerns, SHAI-IL and DASS-21 stress at $\rho \leq .001$ and SSAS and BVS at $\rho \leq .05$. Surprisingly, pain was not correlated with ASI-3 physical concerns. SHAI-IL was significantly correlated with all physical and psychological health measures. SHAI-NC scale was only correlated with the ASI-3 social scale and the DASS-21 scales. Correlations between SSAS, BVS and ASI-3 scales were generally significant but less than .5 signalling that the scales were measuring different constructs.

Between Group Comparisons

Groups 1 and 2 were not significantly different across gender or location. Comparing physical health and psychological measure scores for both groups shows significant differences on most scores. Inspection of Table 11 shows Group 1 (older adults) reported significantly more pain, physical illnesses and lower subjective health than Group 2. On the other hand, Group 1 scores on ASI-3 total, BVS, SSAS and SHAI scores were significantly lower than Group 2 scores. Closer inspection of ASI-3 dimension scores revealed an interesting pattern of differences between scores. Group 1 ASI-3 cognitive scores were slightly higher than those for Group 2 and ASI-3 physical scores were slightly lower. Neither of these differences reached significance. ASI-3 social scores were significantly lower for the older group.

Regression Analyses

Dependent Variable

The Short Health Anxiety Inventory (SHAI, Salkovskis et al., 2002) comprises two subscales. The first fourteen items comprise the main scale of the measure (illness likelihood scale) and the last four items measure the (imagined) negative consequences of illness. The negative consequences scale is considered a measure of the 'awfulness' component in the anxiety equation and assesses the burden of a serious illness (e.g. "*a serious illness would ruin every aspect of my life*"). An initial regression analysis with SHAI-NC as dependent variable showed that none of the body perception constructs reached significance in either group. With SHAI-NC scale as DV, the total model accounted for 19.8% of variance. At the final step, only age reached significance. These results and the finding that this scale is factorially distinct from the main illness likelihood scale; supports

suggestions that this scale represents a separate feature of health anxiety (Salkovskis et al., 2002). The regression analyses were therefore confined to analysis with the SHAI-IL scale as dependent variable for both groups.

Group 1

Medical morbidity/severity measures

Before proceeding with the main analysis, physical illness measures were examined to decide which would provide the best measure of medical morbidity. After considering previous research these were; number of physical illnesses, presence/absence of serious illness and number of serious illnesses. Accumulative SIRS scores and hospital days in the last year were also considered. Similar to other research (e.g., Garrity et al., 1978), correlation between accumulative seriousness scores from SIRS and number of physical illnesses was significant and very high ($\alpha = .95$), therefore accumulative seriousness scores gave no benefit and were not considered further. Second, only six percent of participants reported hospitalisation in the previous year, which reduced the usefulness of this measure. Similar to Holahan and colleagues (2010), the presence/absence of serious illness (cancer, diabetes, heart disease, lung disease, epilepsy and stroke) was considered next. Ninety one percent of participants reported at least one of these serious illnesses. Dichotomous scores with a 90/10 or greater split between categories will give misleading results because the smaller category will have a disproportionate influence on correlations (Tabachnick & Fidel, 2007). In view of this, the presence or absence of serious disease was not considered as a variable.

Finally, the number of serious illnesses was considered. Two regression analyses were conducted with the total number of physical illnesses then number of serious illnesses as independent variable. In this analysis, number of serious illnesses was not a significant predictor at any stage in the analysis, whereas total number of physical illnesses was significant at step one of this initial analysis, but not in the final model. Total number of illnesses appeared to be a slightly stronger predictor. A second group of preliminary regression analyses were conducted substituting subjective measures of physical health as independent variable. As expected, subjective health and subjective worry about current illness, were significant predictors at all stages in these analyses. Comparing the results of the analyses with objective and subjective measures of medical morbidity showed predictors were unchanged in the final model. Because subjective measures of medical morbidity confound the independent and dependent measures (Lawton & Lawrence, 1994),

the final regression analysis was carried out using the number of illnesses as the measure of medical morbidity.

Predictors of Health Anxiety

Regression analyses were carried out to discover which factors were important in the prediction of the health anxiety measure scores. For each group of predictors, regression analyses were conducted with SHAI-IL scale as dependent variable (DV). Each set of potential predictors; demographic, physical health, attitudes to aging and current depression and anxiety, were considered separately. Results are presented in Table 12.

Demographic variables

Demographic variables; age, gender, income, retirement village (yes/no), Auckland (yes/no), tertiary education or training (yes/no) were entered as a block. Taken as a whole, demographic factors were not significant predictors of SHAI-IL scores. R = .17, $F(7,213)$ = .93, *ns,* and accounted for approximately 3% of variance in SHAI-IL scores. The best predictor of SHAI-IL was subjective low income (t = -2.169, ρ = .03).

Physical health variables

The next block of predictors entered were physical function, number of illnesses and pain. Physical health variables statistically predicted health anxiety R = .195, F (10,210) = 5.07, p < .001. These factors accounted for a further 16.5% of variance in the prediction of SHAI-IL scores. Predictors of SHAI-IL were pain (t = -3.314, ρ = .001) and number of physical illnesses (t = 2.234, ρ = .027).

Attitude to aging

At step 3, Attitude to aging was a statistically significant predictor of SHAI-IL R = .473, F (11,209) = 5.48, p <.001. The addition of this predictor added approximately 3% to prediction of SHAI-IL. Predictors for SHAI-IL were pain (t = -2.906, ρ = .004) and attitude to aging (t = -2.806, ρ = .045).

DASS-21

Next, DASS-21 scores were added to the regression for each health anxiety measure. DASS-21 was a significant predictor R = .57, F (14,206) = 6.98, p <.001 and contributed an additional 10% (approximately) to the prediction of SHAI-IL scores, Predictors of SHAI-IL scores were pain (t = -2.061, ρ = .041) and DASS-21 stress (t = 3.227, ρ = .001).

These regression analyses were repeated for the SHAI-IL scale, but using dataset generated from multiple imputation of missing data. The results obtained were very similar to those reported above, and produced no change in the predictors of the SHAI-IL scale.

Body Perception Measures

With SHAI-IL as DV, three models were tested. Regression was carried out in five steps; first demographic variables were entered, then physical health, attitude to aging, current mood and finally the body perception measure(s) of interest. For *Model 1,* ASI-3, BVS and SSAS were entered simultaneously. *Model 2*, anxiety variables of ASI-3 and BVS were entered at step 5. Finally, *Model 3* examined SSAS as a predictor.

Model 1 - ASI-3, BVS and SSAS as predictors

To investigate which of the body perception measures were most important; BVS, SSAS and ASI-3 scores were entered as a block in the final step. These results are given in Table 12.

Model 1 accounted for 49.8% of variance. The combined body perception variables were significant predictors of SHAI-IL, $R = .706$, $F\ (19, 201) = 10.49$, $p < .001$ and accounted for an additional 17.6% of variance over demographic, physical health and current mood variables. In this analysis, predictors were BVS at $\rho \leq .001$ and DASS-21 stress, SSAS, ASI-3 cognitive and pain at $\rho \leq .05$. The emergence of ASI-3 cognitive as a predictor was not as predicted by other studies. To check the reliability of this result, the analysis was re-run with the imputed dataset. This produced similar results, although in this case, ASI-3 cognitive did not quite reach significance at $\rho \leq .05$ ($t = 1.895$, $\rho = .058$).

Table 12

Group 1 - Hierarchical multiple regression predicting health anxiety, all variables

		B	Beta	*p*	R^2	ΔR^2
Step 1					.03	.030
	Gender	.207	.022	.767		
	Age	-.011	-.017	.833		
	Living alone	-.389	-.045	.557		
	Income	-1.391	-.150	**.031**		
	Qualification	-.204	-.023	.740		
	Auckland	.397	.044	.533		
	Village	.261	.030	.703		
Step 2					.195	.165**
	Gender	-.361	-.039	.581		
	Age	-.047	-.069	.369		
	Living alone	-.290	-.033	.634		
	Income	-.388	-.042	.527		
	Qualification	-.129	-.015	.819		
	Auckland	.277	.031	.636		
	Village	-.192	-.022	.763		
	Disability	-.021	-.131	.105		
	Pain	-.044	-.256	**.001**		
	Illness	.304	.159	**.027**		
Step 3					.224	.029**
	Gender	-.167	-.018	.797		
	Age	-.065	-.095	.209		
	Living alone	-.078	-.009	.897		
	Income	-.366	-.039	.545		
	Qualification	-.082	-.009	.883		
	Auckland	.405	.045	.483		
	Village	-.304	-.035	.627		
	Disability	-.013	-.079	.327		
	Pain	-.039	-.224	**.004**		
	Illness	.252	.132	.064		
	Attitude aging	-.621	-.202	**.005**		
Step 4					.322	.098**
	Gender	.049	.005	.937		
	Age	-.071	-.103	.153		
	Living alone	-.188	-.022	.742		
	Income	-.212	-.023	.710		
	Qualification	.017	.002	.975		
	Auckland	.101	.011	.859		
	Village	-.138	-.016	.816		
	Disability	-.012	-.074	.333		
	Pain	-.026	-.153	**.041**		
	Illness	.157	.082	.224		
	Attitude aging	-.318	-.103	.147		
	DASS-21 Anx	.115	.113	.148		
	DASS-21 Dep	.010	.012	.892		
	DASS-21 Stress	.204	.273	**.001**		

Table 12 continued

	B	Beta	*p*	R^2	ΔR^2
Step 5				.498	.176**
Gender	.147	.016	.791		
Age	-.034	-.050	.430		
Living alone	-.716	-.082	.159		
Income	.299	.032	.552		
Qualification	.128	.015	.783		
Auckland	.258	.029	.608		
Village	.091	.010	.861		
Disability	-.012	-.074	.280		
Pain	-.025	-.142	**.031**		
Illness	.122	.064	.288		
Attitude aging	-.068	-.022	.726		
DASS-21 Anx	-.014	-.014	.845		
DASS-21 Dep	-.007	-.008	.913		
DASS-21 Stress	.144	.193	**.013**		
SSAS	.091	.144	**.019**		
ASI-3 physical	.095	.082	.311		
ASI-3 cognitive	.221	.167	**.027**		
ASI-3 social	.045	.040	.613		
BVS	.165	.282	**.000**		

SSAS = Somatosensory Amplification Scale, BVS = Body Vigilance Scale, ASI-3 = Anxiety Sensitivity Index -3, DASS-21 = Depression Anxiety and Stress Scale -21

Figures in bold significant at $\rho \leq .05$ ** significant at $p < .001$

Model 2 - ASI-3 and BVS as predictors

Next, a regression analysis was carried out with ASI-3 dimensions and BVS entered in the last step. Results are given in Table 13. ASI-3 and BVS were significant predictors of the SHAI-IL scale $R = .70$, F (18, 202), $p < .001$. Significant predictors of SHAI-IL scale were BVS at $\rho = .001$ and pain and DASS-21 stress at $\rho \leq .05$. As for Model 1, ASI-3 cognitive but not ASI-3 physical was a significant predictor at $\rho \leq .05$. To examine this unexpected result further, the analysis was re-run using the imputed data set. This analysis confirmed BVS ($t = 5.985$, $\rho = .001$) as the best predictor; followed by DASS-21 stress ($t = 2.396$, $\rho = .017$), ASI-3 cognitive concerns ($t = 2.240$, $\rho = .025$) and pain ($t = -2.110$, $\rho = .035$).

Model 3 - SSAS as predictor

Last, the contribution of SSAS to the prediction of SHAI-IL was considered. Model 3 accounted for 37% total variance, and SSAS was a significant contributor to the model $R = .609$, F (15,153) = 7.40, $p < .001$. Inspecting step 5 of the analysis (see Table 14), SSAS, pain and DASS-21 stress were significant predictors of SHAI-IL scale. SSAS accounted for an additional 5% variance.

Table 13

Group 1 - Hierarchical multiple regression predicting health anxiety, ASI-3 and BVS as predictors

	B	Beta	*p*	R^2	ΔR^2
Step 5				.484	.162**
Gender	.256	.027	.646		
Age	-.049	-.071	.265		
Retirement village	.133	.015	.800		
Living alone	-.634	-.073	.216		
Auckland	.161	.018	.751		
Income	.283	.030	.577		
Qualification	.014	.002	.976		
Physical function	-.017	-.102	.132		
Pain	-.024	-.141	**.034**		
Physical illness	.153	.080	.184		
Attitude to aging	-.107	-.035	.583		
DASS-21 Anxiety	.007	.007	.918		
DASS-21 Dep	-.020	-.025	.746		
DASS-21 Stress	.152	.204	**.009**		
BVS	.188	.323	**.000**		
ASI-3 physical	.093	.081	.325		
ASI-3 cognitive	.256	.194	**.010**		
ASI-3 social	.025	.022	.782		

BVS = Body Vigilance Scale, ASI-3 = Anxiety Sensitivity Index -3, DASS-21 = Depression Anxiety and Stress Scale
Figures in bold significant at $\rho \leq .05$ ** significant at $p < .001$

Post hoc analyses

To investigate the unexpected emergence of ASI-3 cognitive as a predictor, two additional analyses were carried out to examine the contribution of ASI-3 and BVS separately.

ASI-3 scale. With ASI-3 scores entered in step 5 of the regression, ASI-3 scores were statistically significant predictors of SHAI-IL $R = .64$, $F(17,203) = 8.26$, $p < .001$. This model accounted for 41% total variance and the combined ASI-3 scores accounted for 8.7% of variance in the model. Pain, DASS-stress and ASI-3 physical predicted the SHAI-IL scale; (see Table 15). Notably, ASI-3 cognitive ($t = 1.922$, $\rho = .056$) approached significance as a predictor of the SHAI-IL scale.

To assess the statistical effect of the missing data strategy on the analysis, the regression was re-run with missing data imputed. Inspection of results confirmed that predictors at step 5 were pain ($t = -2.849$, $\rho = .004$), DASS-21 stress ($t = 2.968$, $\rho = .003$) and

ASI-3 physical concerns (t = 2.268, ρ =.024). The cognitive concerns scale (t = 1.502, ρ = .133) did not reach significance.

Table 14

Group 1 - Hierarchical multiple regression predicting health anxiety, SSAS as predictor

		B	Beta	*p*	R^2	ΔR^2
Step 5					.371	.049**
	Gender	-.080	-.009	.895		
	Age	-.042	-.062	.379		
	Living alone	-.435	-.050	.433		
	Income	-.104	-.011	.850		
	Qualification	.256	.029	.616		
	Auckland	.274	.031	.616		
	Village	-.186	-.021	.745		
	Physical function	-.005	-.029	.696		
	Pain	-.026	-.149	**.039**		
	Physical illness	.106	.055	.398		
	Attitude aging	-.206	-.067	.334		
	DASS-21 Anx	.066	.065	.391		
	DASS-21 Dep	.028	.034	.690		
	DASS-21 Stress	.181	.243	**.003**		
	SSAS	.163	.257	**.000**		

SSAS = Somatosensory Amplification Scale, DASS-21 = Depression Anxiety and Stress Scale

Figures in bold significant at $\rho \leq .05$, ** significant at $p < .001$

Table 15

Group 1 - Hierarchical multiple regression predicting health anxiety, ASI-3 as predictor

		B	Beta	*p*	R^2	ΔR^2
Step 5					.409	.087**
	Demographic variables			ns		
	Physical function	-.012	-.077	.289		
	Pain	-.033	-.189	**.007**		
	Physical illness	.121	.063	.326		
	Attitude aging	-.228	-.074	.273		
	DASS-21 Anx	.011	.011	.883		
	DASS-21 Dep	.000	.000	.997		
	DASS-21 Stress	.188	.252	**.002**		
	ASI-3 physical	.231	.200	**.018**		
	ASI-3 cognitive	.202	.153	***.056***		
	ASI-3 social	.011	.010	.908		

ASI-3 = Anxiety Sensitivity Index -3, DASS-21 = Depression Anxiety and Stress Scale -21

Figures in bold significant at $\rho \leq .05$ ** significant at $p < .001$ ns = not significant

BVS. BVS significantly predicted SHAI-IL, *R* =.65, *F* (15, 205), = 10.23, *p* <.001. This model accounted for 43% of variance and BVS contributed 10.6% of variance to the model. BVS and DASS-21 stress were significant predictors of SHAI-IL. Pain did not reach significance in this model. Summary results are presented in Table 16.

Table 16

Group 1 - Hierarchical multiple regression predicting health anxiety, BVS as predictor

		B	Beta	p	R^2	ΔR^2
Step 5					.428	.106**
	Demographic variables			ns		
	Physical function	-.017	-.104	.141		
	Pain	-.018	-.104	.132		
	Physical illness	.164	.086	.169		
	Attitude aging	-.175	-.057	.389		
	DASS-21 Anx	.082	.081	.261		
	DASS-21 Dep	-.015	-.019	.815		
	DASS-21 Stress	.176	.236	**.003**		
	BVS	.213	.365	**.000**		

BVS = Body Vigilance Scale, DASS-21 = Depression Anxiety and Stress Scale -21
Figures in bold significant at $\rho \leq .05$, ** significant at $p < .001$ ns = not significant

Group 2

Predictors of Health Anxiety

With SHAI-IL as dependent variable, demographic, health and current mood variables were examined first, then three models with different combinations of the body perception variables were tested.

Demographic variables were not a significant predictor of SHAI-IL scores accounting for 5% of variance. Only gender was a significant predictor at the .05 level (t = 2.197, ρ = .029). At step 2, physical health measures; physical illness and pain, were entered. Physical health accounted for a further 17% of variance and was a significant predictor of SHAI-IL scores (R=.476, F_{change} = 18.84, d*f* 2, 168, $\rho \leq .001$). Both pain and physical illness were significant predictors at this step. At step 3, the DASS-21 scale scores were entered as a block and were significant predictors of SHAI-IL scores (R=.526, F_{change}=3.812, d*f* 3,165, ρ =.011) and accounted for an additional 5% of variance. At this step, DASS-21 anxiety, pain and physical illness were significant predictors of SHAI-IL scores.

Model 1 - ASI-3, BVS and SSAS variables

SSAS, BVS and the three scales of ASI-3 were entered simultaneously and were significant predictors of SHAI-IL, $R = .67$, $F(16, 160) = 8.27$, $\rho \leq .001$. The final model accounted for 46% of variance, with the combined body perception variables accounting for 18% of variance. Pain, physical illness, BVS and ASI-3 physical concerns were significant predictors with SSAS just reaching significance at $\rho = .05$. Results are summarised in Table 17.

Model 2 - ASI-3 and BVS

ASI-3 and BVS were significant predictors of SHAI-IL, $R = .668$, $F(15,161) = 8.646$, $p < .001$. These variables accounted for 17% of variance in the final model. Predictors in the final model were physical illness, pain, and ASI-3 physical at $\rho < .05$ and BVS at $\rho < .001$. Results are presented in Table 18.

Model 3 - SSAS as predictor

SSAS was a significant predictor of health anxiety, $R = .587$, $F(12, 164) = 7.192$, $p < .001$. The final model accounted for 34.5% variance. In this model, physical illness, and SSAS were predictors at $\rho \leq .001$ and pain at $\rho \leq .05$. See Table 19 for results.

Post hoc analysis

Since prior work with student cohorts has usually excluded or ignored physical illness measures (see Table 1) together with the unexpected influence of physical illness in the final model; the next step was to test the robustness of this finding by using different measures of physical illness. The correlation between number of illnesses and SIRS severity scores was .97 so this was not considered. Only 10% of participants reported any serious illness. This uneven distribution would over emphasise the contribution of the measure to the model (Tabachnick & Fidell, 2007) and no further investigation was conducted. The only alternative measures that might provide some clarity were the presence/absence of chronic illness or presence/absence of any illness as a measure of physical health instead of number of physical illnesses. Considering step 2 of the analysis, neither the chronic illness measure nor presence/absence of physical illness were significant predictors. At step 4 pain and the psychological measures were predictors, but not chronic illness. The final model accounted for 43.5% variance, a reduction from the first model.

Table 17

Group 2 - Hierarchical multiple regression predicting health anxiety, all variables

		B	Beta	*p*	R^2	ΔR^2
Step 1					.053	
	Gender	1.649	.166	**.029**		
	Age	.104	.065	.457		
	Living alone	2.540	.040	.601		
	Location	.162	.016	.835		
	Income	.058	.006	.942		
	Student	1.535	.153	.095		
Step 2					.226	.173**
	Gender	.833	.084	.234		
	Age	.073	.045	.567		
	Living alone	3.792	.059	.394		
	Location	.290	.029	.681		
	Income	-.114	-.012	.876		
	Student	1.478	.148	.078		
	Pain	-.068	-.242	**.001**		
	Physical illness	1.087	.273	**.000**		
Step 3					.276	.050**
	Gender	.659	.066	.341		
	Age	.123	.076	.342		
	Living alone	4.118	.064	.346		
	Location	.296	.029	.671		
	Income	.014	.001	.984		
	Student	1.371	.137	.101		
	Pain	-.057	-.204	**.007**		
	Physical illness	.943	.237	**.001**		
	DASS-21 Anxiety	.184	.200	**.024**		
	DASS-21 Dep	-.018	-.026	.776		
	DASS-21 Stress	.043	.080	.409		
Step 4					.459	.183**
	Gender	-.379	-.038	.555		
	Age	1.823E-5	.000	1.000		
	Living alone	1.772	.028	.645		
	Location	.029	.003	.963		
	Income	.187	.019	.769		
	Student	.529	.053	.479		
	Pain	-.050	-.176	**.008**		
	Physical illness	.730	.184	**.006**		
	DASS-21 Anxiety	.014	.015	.851		
	DASS-21 Dep	-.007	-.011	.900		
	DASS-21 Stress	.036	.067	.442		
	SSAS	.111	.142	**.050**		
	BVS	.184	.289	**.000**		
	ASI-3 physical	.235	.190	**.006**		
	ASI-3 cognitive	.038	.028	.706		
	ASI-3 social	.044	.046	.551		

Figures in bold, predictors significant at ρ≤.05, ** significant at *p* <.001

Table 18

Group 2 - Hierarchical multiple regression predicting health anxiety, ASI-3 and BVS as predictors

		B	Beta	*p*	*R*	ΔR^2
Step 4					.446	.170**
	Gender	-.069	-.007	.913		
	Age	-.009	-.005	.941		
	Living alone	1.755	.027	.652		
	Income	.204	.021	.751		
	Student	.603	.060	.424		
	Auckland	-.051	-.005	.934		
	Physical illness	.645	.162	**.015**		
	Pain	-.054	-.191	**.004**		
	DASS-21 Anxiety	.017	.018	.827		
	DASS-21 Depression	.003	.005	.957		
	DASS-21 Stress	.040	.073	.406		
	BVS	.213	.334	**.000**		
	ASI-3 physical	.249	.202	**.004**		
	ASI-3 cognitive	.041	.031	.687		
	ASI-3 social	.059	.062	.424		

BVS = Body Vigilance Scale, ASI-3 = Anxiety Sensitivity Index -3, DASS-21 = Depression Anxiety and Stress Scale
Figures in bold significant at $\rho \leq .05$, ** significant at $p < .001$

Table 19

Group 2 - Hierarchical multiple regression predicting health anxiety, SSAS as predictor

		B	Beta	*p*	R^2	ΔR^2
Step 4					.345	.069**
	Gender	-.191	-.019	.782		
	Age	.110	.068	.372		
	Living alone	3.624	.057	.385		
	Income	.014	.001	.984		
	Student	1.019	.102	.203		
	Auckland	.387	.038	.562		
	Physical illness	1.038	.261	**.000**		
	Pain	-.048	-.171	**.018**		
	DASS-21 Anxiety	.142	.154	.070		
	DASS-21 Dep	-.039	-.057	.515		
	DASS-21 Stress	.034	.062	.501		
	SSAS	.234	.297	**.000**		

SSAS = Somatosensory Amplification Scale, DASS-21 = Depression Anxiety and Stress Scale
Figures in bold significant at $\rho \leq .05$ ** significant at $p < .001$

ANALYSIS III - EVALUATION OF BVS-H SCALE

The BVS scale measures vigilance to autonomic sensations, such as breathlessness and increased heart rate, found in panic. Health anxious individuals pay attention to both autonomic and non-autonomic sensations such as rashes and headache (Walker & Furer, 2008; Watt & Stewart, 2000), and the BVS likely underestimates the effects of vigilance in health anxiety (Deacon & Abramowitz, 2008). As described in Chapter 5, to provide a preliminary indication of the effects of non-arousal symptoms in health anxiety, six items were added to the original BVS scale. This section describes the results of factor analysis and regression analysis for this new measure for both groups.

Factor Analysis - BVS-H Scale

As described previously, an exploratory factor analysis for both older and young adult groups was carried out using principal factor analysis (PFA).

Data cleanup. Data were inspected for missing data and multivariate normality. Of the 221 participants for the older group, three participants had left the BVS-H question blank and were removed from the analysis, leaving N = 218. Incomplete responses on some items left N (listwise) = 216. Missing data was <1% so no missing data strategy was implemented (see Appendix C 7)

For the 18-30 group, N = 175 and there were no significant deviations from normality. Inter-item correlations were inspected for both groups (see Appendix C 8). Inspection of correlations between items 4 and 5 showed that they were separate items.

Results. Internal consistency for the BVS-H was moderate at .81 for Group 1 and .83 for Group 2. Initial analysis for the older group found a two-factor structure, comprising items one and two on factor one and four and five on the second factor, with item three loading equally on each factor. The eigen value for the second factor was 1.00 and inspection of the scree plot implied that a single factor solution would be more parsimonious, accounting for 50 % of variance. Analysis of 18-30 group data found a single factor structure accounting for 51% of variance. Factor loadings are given in Table 20.

Table 20

Groups 1 and 2 - Factor loadings BVS-H scale

	Factor loadings	
	65+ group	18-30 group
Item 1	.828	.899
item 2	.863	.855
Item 3	.569	.628
Item 4	.670	.560
Item 5	.546	.550

Regression Analysis - BVS-H Scale

Group 1

Regression was carried out with ASI-3 and BVS-H as predictors. ASI-3 cognitive and BVS-H were significant predictors. This model accounted for 15.4% of variance. Comparing this with the regression analysis for BVS (refer Table 13), the BVS-H scale gave a 1% reduction in variance and left the predictors of SHAI-IL largely unchanged. Results are given in Table 21.

Group 2

Regression analysis was conducted with ASI-3 and BVS-H as predictors. Compared with the BVS scale alone (see Table 18), regression analysis for Group 2 did not change the predictors in the final model and there was a 1% reduction in the variance explained by the model. Results are shown in Table 22.

***Conclusions**:* This analysis showed a single factor structure of the BVS-H scales in both groups. Factor loadings were similar across both groups and both scales. The BVS-H scale provides slightly lower estimates of total variance than the BVS scale. When compared with results from the BVS analyses, regression analysis gave similar results for both groups implying that the BVS-H was comparable to the original.

Table 21

Group 1 - Hierarchical multiple regression predicting health anxiety, ASI-3 and BVS-H as predictors

	B	Beta	*p*	R^2	ΔR^2
Step 5				.476	.154**
Gender	.218	.023	.698		
Age	-.050	-.074	.253		
Retirement village	.173	.020	.745		
Living alone	-.597	-.068	.248		
Auckland yes/no	.178	.020	.728		
Income	.325	.035	.527		
Highest qual	.037	.004	.937		
Physical function	-.016	-.099	.146		
Pain	-.023	-.130	***.053***		
Physical illness	.155	.081	.184		
Attitude to aging	-.081	-.026	.682		
DASS-21 Anxiety	-.004	-.004	.958		
DASS-21 Dep	-.015	-.018	.817		
DASS-21 Stress	.155	.208	**.008**		
BVS-H	.162	.315	**.000**		
ASI-3 physical	.105	.090	.271		
ASI-3 cognitive	.229	.173	**.022**		
ASI-3 social	.029	.026	.743		

Table 22

Group 2 - Hierarchical regression analysis predicting health anxiety, ASI-3 and BVS-H as predictors

	B	Beta	*p*	R^2	ΔR^2
				.439	.162**
Gender	-.112	-.011	.861		
Age	-.004	-.002	.974		
Living alone	1.826	.029	.641		
Location	-.008	-.001	.989		
Income	.194	.020	.765		
Student	.600	.060	.429		
Pain	-.049	-.174	**.010**		
Physical illness	.705	.174	**.009**		
DASS-21 Anxiety	.028	.031	.713		
DASS-21 Depression	.002	.003	.969		
DASS-21 Stress	.035	.065	.462		
BVS-H	.173	.319	**.000**		
ASI-3 physical	.256	.207	**.003**		
ASI-3 cognitive	.032	.024	.752		
ASI-3 social	.066	.069	.378		

BVS-H = modified body vigilance scale, ASI-3 = Anxiety Sensitivity Index -3, DASS-21 = Depression Anxiety and Stress Scale. Figures in bold significant at $p \leq .05$, ** significant at $p < .001$

CHAPTER 10 - DISCUSSION

"We must move beyond both positive and negative ageism to understand the complexities of our aging society."

Steven Katz, 2001[6]

The primary purpose of the present study was to increase the body of knowledge about health anxiety in older adults and to provide a comparison with a younger cohort. The present study comprised three interconnected investigations. The principal investigation was an analysis of the contribution of body perception variables to health anxiety in an older cohort. This examination also assessed the contribution of demographic, physical health and current wellbeing in these relationships and differences between the two groups. To provide confidence in the strength of the findings of the principal investigation, a preliminary study examined the factorial validity of the measures of body perception and health anxiety. Finally, the utility of a modified version of the body vigilance scale was conducted.

The following discussion examines each research question in turn. To provide a context for the later discussion of the regression analyses, the first paragraphs examine the results of the preliminary study, and discuss the factor structures of the health anxiety and body perception measures in the older adult cohort. Next, health anxiety and body perception scores are discussed, then an overview of variables that predict health anxiety follows, the two age groups are compared and contrasted throughout. Implications for the cognitive model are presented, and the chapter concludes with the limitation of the present research and suggestions for future studies.

Preliminary Study - Factor Structure of Measures

Is the factor structure and internal consistency of health anxiety, anxiety sensitivity, body vigilance, somatosensory amplification measures for older adults comparable to that found for younger adults?

To achieve this aim, the internal reliabilities, inter-scale correlations and factor structure of SHAI, ASI-3, BVS and SSAS were tested for the older cohort. Overall, internal

[6]http://www.trentu.ca/news/view/aging.html

consistencies for the measures were similar for the two groups and of similar magnitude to those reported in prior studies (e.g. Schmidt et al., 1997; Speckens et al., 1996; Wheaton et al., 2010, 2012). Convergent validity was assessed by examination of correlations between the SHAI and other constructs. Generally, correlations were congruent with other studies. The exception to this was the unusual relationship between the cognitive dimension of anxiety sensitivity and health anxiety, which is discussed below.

SHAI. The factor structure of SHAI was subject to three analyses. First, using data from a previous study by Boston and Merrick (2010), an exploratory factor analysis was carried out. This analysis found that the four last items loaded onto a single factor named the negative consequences factor and the other 14 items loaded onto two factors. Comparisons with other work showed some inconsistencies in the composition of these two factors. These differences were possibly attributable to age differences between samples (Byrne, 2010) or the moderate sample size in this element of the current study. Second, these results were cross-validated using data from the current study. Three competing models were subject to confirmatory factor analysis. The CFA found that a two-factor structure gave best fit to the data. Finally, to provide further cross validation and overcome possible error due to the relatively moderate power of the analysis, the data sets were combined and subject to confirmatory analysis. This confirmed the two-factor structure of the SHAI measure as suggested in previous work with clinical, student and community populations (Abramowitz, Olatunji, et al., 2007; Salkovskis et al., 2002; Wheaton, Berman, Franklin, et al., 2010). In conclusion, a two-factor solution for the SHAI measure gave best fit to the data for this older cohort, which replicates the factor structure reported previously.

ASI-3. The factor structure of the ASI-3 appears to be stable in clinical and non-clinical populations (e.g., Kemper et al., 2009; Taylor et al., 2007). To verify this factor structure for older adults, a confirmatory factor analysis was carried out with data from the current study. Four models were analysed; a single factor, 2 two-factor and a three-factor model. The single and two factor models did not adequately explain the factor structure of the ASI-3 in this older population. The 3 factor model gave adequate CFI and TFI values, however the RMSEA value, although less than the recommended threshold for rejection of the model, was greater than the threshold for a moderate fit (Brown, 2006). These results indicate that there were some possible inadequacies in the factor structure of ASI-3 for this older adult cohort. Interestingly, prior research found that the RMSEA value was greater than optimum (e.g. Taylor et al., 2007; Wheaton et al., 2012) for some populations. Taylor

and colleagues (2007) concluded that the higher than desirable RMSEA value in their clinical sample, was not due to poor model fit, but more likely due to an interaction between medication and anxiety sensitivity scores. Although the older adult cohort was likely to be taking multiple medications, any effects due to medication were not accounted for in the current research and may have influenced these results.

There are a number of other considerations when reviewing these results. First, there was a moderate level of missing and incomplete data which left the final sample size at the minimum recommended for WLSMV analysis (Brown, 2006), and reduced the power of the analysis. Internal reliability of the measure was, however, consistent with prior research. Additionally, with the notable exception of analyses involving the BVS measure, the regression analyses reported above gave results that were similar to those found with younger adults. These conditions suggest that for the purposes of this study, the three dimensions of the ASI-3 were adequate and equivalent to those reported with younger adults. The factor structure in older adults warrants further study however.

BVS. Prior studies have shown a single factor structure in clinical and non-clinical populations (Olatunji et al., 2007; Schmidt, Lerew, & Trakowski, 1997). Exploratory factor analysis confirmed the single factor structure of the measure in the older cohort.

SSAS. Since the only analyses of the factor structure of SSAS have been carried out in non-English speaking cohorts (e.g. Speckens, Spinhoven, et al., 1996), exploratory factor analysis was conducted. This analysis confirmed findings by Speckens and colleagues (1996) that a single factor model best explained the factor structure of the measure for older adults.

Interpretation of Scores

> *In which ways do the health anxiety, anxiety sensitivity, body vigilance and somatosensory amplification variables differ for young and older adults.*

Scores on the body perception measures were consistent with prior studies with similar non-clinical cohorts (see Appendix E 3). Health anxiety and body perception scores were significantly lower for older adults when compared with the younger cohort. Correlations between measures were also consistent with expectations, indicating that relationships between measures were as predicted from prior research.

As reported in previous studies, older adults were significantly less health anxious than the younger group (Boston & Merrick, 2010; Bourgault-Fagnou & Hadjistavropoulos, 2009). SHAI scores for the older cohort were similar to those reported by Boston and Merrick (2010) in their comparable cohort of older adults in New Zealand. Similarly, SHAI scores for the younger group were comparable to those reported by Wheaton and colleagues (2010). New studies by Gerolimatos & Edelstein (2012a, 2012b) published online during the final stages of writing this thesis, investigated the relationships between health anxiety, anxiety sensitivity, intolerance of uncertainly and age. Similar to the current study and previous findings, these researchers reported SHAI scores were significantly lower for their older adult cohort. Although cohort and demographic effects cannot be discounted as causes of the lower levels of health anxiety, the consistency of the findings across four studies, and three different countries, suggest that this is a robust effect that counters the stereotypical image of the hypochondriacal older adult in the community.

Critically, although health anxiety levels were generally low in the current study, a significant proportion of younger and older adults reported severe health anxiety. Approximately 7% of the older group were above the cut-off score for problematic health anxiety suggested by Rode and colleagues (2006), which was almost identical to the proportion of older adults with severe health anxiety reported by Boston and Merrick (2010). The proportion of the older group reporting severe health anxiety exceeded the 12 month prevalence of any anxiety disorder (6%) for the over 65 age group reported in the New Zealand Mental Health Survey (Oakley Browne et al., 2006), suggesting that health anxiety is a noteworthy clinical problem. The percentage of younger adults experiencing significant levels of health anxiety was twice that of the older cohort. Prior studies by Wheaton Burman and Abramowitz (2010) and Fergus and Valentiner (2011) reported that a similar proportion of their student participants reached threshold scores for acute health anxiety, suggesting that high health anxiety is a characteristic of this cohort and an important clinical issue.

As expected, and equivalent to previous findings (Deer & Calamari, 1998; Fuentes & Cox, 2000; Gerolimatos & Edelstein, 2012a), total anxiety sensitivity was significantly lower among the older group when compared with the younger cohort. Both ASI-3 total and dimensional scores for the younger group were comparable to those reported by Wheaton and colleagues (2010, 2012). There are no extant studies using ASI-3 with older adult participants to provide a comparison. Examination of the dimensional scores showed that only ASI-3 social scores were significantly different between groups. Interestingly, young

adult participants from both the current and Wheaton and colleagues (2010, 2012) studies consistently reported high levels of ASI-3 social concerns. The effect of increasing age on these scores has not been previously investigated and therefore cannot be contextualised. The findings are, however, consistent with social anxiety being less prevalent in older adults compared with younger people (Wolitzky-Taylor et al., 2010) and older adults reporting reduced worry about social issues (Jeon et al., 2006). ASI-3 physical and cognitive scores were not statistically different across the two groups in the present study.

Contrary to expectations, BVS scores for the older group were significantly lower than those for younger adults. BVS scores from prior studies with young adults (Olatunji et al., 2007; Wheaton, Berman, Franklin, et al., 2010) were lower than those found here, but higher than those reported for the older group. The apparently reduced vigilance and awareness of bodily sensations in the older cohort was counterintuitive, given the stronger emphasis on the physical in later life (Knight & Laidlaw, 2009) and increased internal awareness reported among older adults (Montepare, 2006). Findings that older adults are poor at noticing and interpreting physical symptoms (e.g., Hart, 1990; Lau et al., 2001) and attribute symptoms to the aging process (Pinquart, 2001), may be factors in the low BVS scores. Additionally, experimental research proposes that older adults are more attentive to physical symptoms if they are experiencing low mood or anxiety (Fox & Knight, 2005; Teachman & Gordon, 2009) and hold negative stereotypes of aging (Poon & Knight, 2009). The majority of older adult participants in the current study reported generally low levels of anxiety and depression (as measured by DASS-21), hence were likely less attentive to physical symptoms, and thus recorded low vigilance scores.

Older adults reported significantly lower SSAS scores than the younger group. Limited prior research has suggested that somatosensory amplification scores are not related to age (Barsky, Frank, et al., 1991; Jung et al., 2003), a finding not replicated in the present study. SSAS scores were of similar magnitude to previous reports for both groups (e.g., Barsky, Wyshak, & Klerman, 1990; Speckens, Spinhoven, et al., 1996). This result suggests that, similar to the BVS scores, low levels of psychological distress in this cohort of older adults lowered sensitivity to physical cues.

Correlations

In accordance with theoretical predictions, health anxiety, body vigilance, anxiety sensitivity, and somatosensory amplification scores were significantly and moderately correlated for both groups. This was consistent with the notion that the instruments were

measuring independent constructs. Comparing correlations across the two groups showed some unexpected anomalies in the relationships between the dimensions of ASI-3 and SHAI. Notably, correlations between all dimensions of ASI-3 were of similar magnitude for the older adult group. Of particular note, the cognitive dimension correlated higher with health anxiety than the physical dimension. These findings are explored further later in the discussion.

Predictors of Health Anxiety

> *Which variables are statistical predictors of health anxiety in older adults, and how do they differ from those for younger adults.*

Before examining the influences of body perception variables in the prediction of health anxiety, four groups of variables were examined as possible confounds in these relationships. These were demographic, physical health, attitude to aging and DASS-21 variables. Because the attitude to aging measure was specific to the older group, this was not examined as a variable in the younger group.

Demographic factors. As predicted and similar to previous findings, the contribution of demographic factors in the prediction of health anxiety across both groups was minor and not significant. This is comparable with other studies that have found no systematic relationship between demographic factors and health anxiety for younger adults (Barsky, Wyshak, Klerman, et al., 1990; Creed & Barsky, 2004) or older adults (Boston & Merrick, 2010). For the older group, subjective income reached significance, which did not replicate findings in the Boston and Merrick (2010) study. This corresponds however, with epidemiological findings with older adults (Ghubach et al., 2004), and may reflect the relationship between low socioeconomic status and poor mental health in older adults (e.g., Stephens et al., 2010). In the younger group, gender reached significance. This mirrors findings that women tend to report more symptoms (Lyons & Chamberlain, 2006) and experience higher levels of illness worry than men (Noyes et al., 2005; Noyes et al., 1993). Age was not associated with health anxiety for either group, which corresponds with previous findings in older adult research (Barsky, Frank, et al., 1991; Boston & Merrick, 2010; Bourgault-Fagnou & Hadjistavropoulos, 2009).

Physical health. As hypothesised, physical health factors were significant predictors of health anxiety across both groups, and contributed similar levels of variance in both groups. This corresponds with prior research with older adults (Boston & Merrick,

2010; Bourgault-Fagnou & Hadjistavropoulos, 2009). There is less direct evidence to support this result for the younger group, as many studies with younger community based adults did not consider or specifically exclude physical health as a factor. Epidemiological studies however, have found consistent relationships between physical health factors such as illness and disability, and health anxiety in community populations (e.g., Bleichhardt & Hiller, 2007; Looper & Kirmayer, 2001).

Pain was significantly correlated with and predicted health anxiety for both groups. This is consistent with findings that pain is associated with abnormal illness behaviour (Pilowsky & Spence, 1976) and health anxiety (Rode et al., 2006) in adult populations. Bourgault-Fagnou and Hadjistavropoulos (2009) found that pain was associated with, but was not a predictor of, health anxiety in their older adult cohort. These researchers reported that frailty but not pain predicted health anxiety. It should be noted however, that the measurement of 'frailty' included subjective health, which may have inflated the statistical influence of this factor. The influence of pain in the final model was unanticipated, particularly as the mean pain measurement was within normal limits. This result may have been a function of the subjective nature of this measure. Additionally, the measure did not consider the effects of chronicity of pain.

Unexpectedly, physical function did not predict health anxiety in the older group, which contradicts findings with Boston and Merrick's (2010) similar cohort of older adults from New Zealand. Boston and Merrick (2010) did not include pain as a predictor variable, and a relationship between pain and disability may account for this difference. The influence of physical function was not investigated in the younger cohort. Almost all younger participants reported no limitations in physical function, suggesting that the measure was not sufficiently sensitive to capture subtle differences in this high functioning cohort.

The aggregate number of physical illnesses was a significant predictor of health anxiety for both groups when first entered into the regression. Similar to Boston and Merrick (2010), physical illness was not a predictor of health anxiety in the final model. Other studies with older adults did not examine this specific relationship. In the study by Bourgault-Fagnou & Hadjistavropoulos (2009), physical illness was subsumed into the measurement of frailty and Bravo and Silverman (1999) did not report the relationship between medical illness and health anxiety. Physical illness remained a significant predictor in the final model for the younger group. It is difficult to contextualise the findings with

younger adults because, as noted previously, studies with younger adults often exclude physical illness as a factor under consideration.

The recent study by Gerolimatos and Edelstein (2012b) is a notable exception. These researchers measured the number of physical illnesses for their older adult and student groups. Regression analysis showed that, after controlling for age, the number of physical illnesses predicted health anxiety in their combined group of young and older adults, suggesting that physical illness contributed to health anxiety regardless of age.

Preliminary and post hoc analysis for both groups found that the physical illness/health anxiety relationship was sensitive to the type of physical illness measure employed. For older adults, limiting illnesses under consideration to the sum of the six most serious diseases did not change the outcome. In the younger group, changing the physical illness measure to a dichotomous measure of chronic illness, removed physical illness as a predictor in the final model, suggesting that dichotomising the measure reduced the variance in the measure and attenuated the statistical relationships. This illustrates the importance of the selection of meaningful measures of physical illness in future studies.

DASS-21 scores. DASS-21 scores contributed twice the variance in the model for the older group compared with the younger group. Unexpectedly, in the final model, health anxiety in the older group was associated with DASS-21 stress. This is however, perhaps less surprising considering that DASS-21 stress is a measure of generalised anxiety (T. A. Brown et al., 1997) and may thus be considered a proxy measure of worry. Worry is a cardinal feature of health anxiety (e.g. Salkovskis, 1996), and research with younger adults has shown that worry predicts health anxiety (Abramowitz et al., 2007). These findings, in concert with the prevalence of GAD and subsyndromal GAD and association with health worry in older adults (S. Hunt et al., 2009; Montorio et al., 2003; Wolitzky-Taylor et al., 2010), suggests that the DASS-21 stress subscale captured the well-established link between health anxiety and worry in this cohort of older adults.

DASS-21 anxiety predicted health anxiety for the younger group, and was not a significant predictor in the final model. This is not consistent with prior studies with younger adults that reported depression predicted scores on the SHAI scale (Wheaton, Berman, & Abramowitz, 2010; Wheaton, Berman, Franklin, et al., 2010). This divergent result may have been due to inclusion of physical health measures in the final model

providing a more stringent test of relationships. Differences in measurement between the studies may also account for some of the discrepancy.

Attitude to aging. As inferred from prior research (e.g. Poon & Knight, 2009), attitude to aging was a minor but significant factor in the older group, contributing variance at a similar level to the demographic factors, signifying that although this was an important contributor to health anxiety, other variables such as pain had greater impact.

Body Perception Variables as Predictors

The next stage of analysis examined the relationships between health anxiety and the body perception variables by first controlling for probable confounds noted above, then entering different combinations of the perception constructs. Three models were examined; first, the three body perception variables were entered simultaneously; second, the effects of removing the somatosensory amplification variable from the regression were assessed. The final model examined only the somatosensory amplification variable as a predictor. Results for each group are discussed separately.

Group 1 - older adults

As predicted by the cognitive model, BVS was the strongest predictor of SHAI scores. Next were DASS-21 stress, SSAS ASI-3 cognitive and pain, ASI-3 physical and social dimensions did not reach significance. This model was a stringent test of the relative efficacy of the anxiety and amplification variables to predict health anxiety because of the thorough control of potential contributors to health anxiety. Post hoc analysis reducing the control variables to physical health and DASS-21, did not substantially change the conclusions. Likewise, removing SSAS from the analysis did not essentially change the significant predictor variables. Excluding ASI-3 and BVS from the model left SSAS as the strongest predictor, followed by DASS-21 stress, then pain.

Interpretation of these results can only be speculative, as there are no prior studies with older adults to provide context. Taken as a group these findings indicate that body perception constructs provide useful explanations for health anxiety for this older cohort. A highly surprising finding, and one that is not supported in the literature with younger adult cohorts, is that the ASI-3 cognitive dimension and not the ASI-3 physical dimension reached significance. In addition, as noted above, the cognitive dimension had the strongest correlation of any anxiety sensitivity dimension with health anxiety. This could be interpreted as a true result or a statistical artefact of the analysis.

It is possible that this represents a true difference in the way in which health anxiety manifests in older adults. This result may reflect several underlying relationships reported in earlier studies with older adults. Anxiety sensitivity and subjective memory complaints are related (e.g., Dux et al., 2008) and worry about memory increases with age (Jeon, Dunkle, & Roberts, 2006). A plausible hypothesis might be that rather than negative beliefs about physical symptoms causing health anxiety, beliefs about loss of mental faculties might be more salient for the older cohort. A second hypothesis concerns the inter-relationships between GAD, body vigilance and anxiety sensitivity. Body vigilance and anxiety sensitivity are related and both are associated with GAD (e.g. Olatunji et al., 2007). Additionally, Olatunji and Wolitzky-Taylor (2009), suggested that the cognitive concerns dimension of anxiety sensitivity was related to GAD. These findings combined with the strength of the DASS-21 stress (a proxy for GAD) association argue that the presence of GAD symptoms (i.e. worry) might be a controlling factor in this relationship. However, arguing against this, post hoc analyses found that the DASS-stress association with health anxiety was robust regardless of the body perception variables in the final model. The arguments presented above, suggest that an underlying relationship between anxiety sensitivity and body vigilance not seen in younger adults, might be the most plausible explanation. Recent findings that ASI-3 cognitive scale was correlated with symptom burden (Kemper et al., 2012), may have relevance. Arguably, the BVS could be considered a proxy measure of symptoms and the current result may reflect the findings by Kemper and colleagues.

There are counter arguments, suggesting this was a result of inadequacies in the measure particular to an older cohort. First, inspection of raw data revealed that ASI-3 had among the largest percentage of missing data and older age was correlated with missing data. Second, as discussed above, the factorial adequacy of the ASI-3 measure was inconclusive. Finally, the instructions given for completion of the ASI-3 are quite complex and cognitively demanding, stating: *"If any items concern something that you have never experienced (e.g. fainting in public) then answer on the basis of how you think you might feel* if you had *such an experience".* These factors in turn suggest an alternative scenario, where the ASI-3 was an unsuitable measure for the older adults, especially those more likely to be experiencing compromised cognition.

Group 2 - young adults

Taken together, and as predicted by the cognitive model, the three body perception variables were significant predictors of SHAI scores. Predictors were BVS

followed by ASI-3 physical, pain and number of physical illnesses and SSAS just reached significance at ρ=.05. Excluding SSAS from the final model did not change strength of predictors, or relative relationships between variables. In the final model, predictors were SSAS, physical illnesses and pain.

After controlling for demographic, physical health, depression and anxiety, the cognitive behavioural variables associated with anxiety (ASI-3 and BVS) had a stronger relationship with health anxiety than the amplification variable (SSAS). This suggests that for this younger cohort, amplification may be a less important feature of health anxiety than anxiety. Fergus and Valentiner (2010) investigated the role of body perception variables in health anxiety in a student cohort and reported a similar hierarchy with amplification being a lesser predictor when compared with the physical dimension of anxiety sensitivity and body vigilance. Results for Model 2 are comparable with those reported by Wheaton et al., (2010) with a large cohort of undergraduates. Although the present study provided a more stringent test of relationships by controlling for pain and physical illness, the relationships between body vigilance, physical anxiety sensitivity and health anxiety were very similar to those reported by Wheaton and colleagues (2010). Finally, the result for Model 3 is congruent with prior research with hypochondriasis patients (e.g., Barsky, Wyshak, & Klerman, 1990).

Evaluation of BVS-H

> *What effect does the revision to the BVS scale have on the relationships between body vigilance and health anxiety and what is the factor structure of this measure?*

In response to suggestions that the BVS scale might not fully reflect the self-monitoring found in hypochondriasis, a revised scale was constructed with a fifth item to reflect the non-autonomic arousal symptoms that may be important in health anxiety. Analysis of this measure found similar values for Chronbach's alpha for both groups. Correlations between the two measures were high suggesting that they were measuring similar constructs. Exploratory factor analysis found a single factor structure and comparable total explanatory variance for both groups.

Critically, the BVS-H scale did not provide higher explanatory variance than the BVS scale. Regression analysis substituting the BVS-H for BVS scale, provided slightly lower estimates of total variance than the BVS scale, implying that the BVS-H may not give

significant advantage over the original. This result is somewhat in conflict with the assumptions of the cognitive model (e.g. Salkovskis, 1996) and Walker and Furer's (2008) empirical findings that both non-autonomic and autonomic symptoms were triggers for anxiety in their hypochondriasis patients. Conversely, Watt and Stewart (2000) found in their non-clinical student sample, highly health anxious individuals were sensitive to all somatic sensations and did not differentiate between symptoms found in panic and non-autonomic symptoms. Results of the current study echo those found by Watt and Stewart and may be specific to the experience of non-clinical cohorts. Further research with clinical populations is needed to provide clarity. Equally, the adaptation to the measure was very preliminary and further development studies may be of benefit.

Summary of Results

First and foremost, the current study provided new evidence that the cognitive theory of health anxiety was a useful explanatory model for health anxiety in older adults. The relationships between health anxiety and the anxiety constructs of body vigilance, anxiety sensitivity and worry further supported the conceptualisation of health anxiety as an anxiety disorder rather than a somatisation disorder in both older and younger adults. Results indicated that amplification may be an important contributor to the model for older adults but not younger adults. The role of anxiety sensitivity in the model was less clear. Although as anticipated, total anxiety sensitivity was related to health anxiety for both cohorts, examination of the dimensions of anxiety sensitivity in the older adult group, showed some departures from expectations. Notably, when examined in conjunction with the body vigilance construct, the cognitive dimension of anxiety sensitivity assumed greater importance than the physical dimension in the explanation of health anxiety. The previous discussion suggests number of possible reasons for this; however, it seems probable that there is an underlying interaction between health anxiety, body vigilance and anxiety sensitivity not found in younger adults.

There were interesting differences in the predictors of health anxiety between the groups. Age was not a predictor for either group, suggesting that differences in predictor variables were more likely to be due to cohort or other factors rather than age per se. Despite having fewer and less-serious physical illnesses, physical illness was a factor in the prediction of health anxiety for the younger group. A possible explanation is that the older cohort has become habituated to the presence of disease or attributes symptoms to age not illness (e.g. Prohaska et al., 1987); therefore experience less anxiety than the younger

group. Pain was a significant predictor in both groups, which suggests that this factor deserves more attention in health anxiety.

Older adults in the current study were significantly less health anxious than the younger cohort and had significantly lower scores on all psychological measures in spite of higher levels of physical illness and pain, and lower physical abilities. As suggested by the CALTAP model (Knight & Poon, 2008) some of these differences might be due to differences in the experience and expression of emotion between the two cohorts. Older adults, for example, tend to under-report emotional distress (Zarit & Zarit, 2007), which may be due to minimisation of symptoms or attributing them to age or illness, rather than identifying them as emotional difficulties (Pinquart, 2001). Others would argue that despite the decrements of age, older adults experience greater positive affect (Carstensen et al., 2011) and that this could account for reduced psychological distress. Health anxiety, body vigilance and somatosensory amplification measures used in the current study have similar factor structure and internal consistencies in the older adult cohort to those reported in prior research with younger adults, suggesting that results obtained from these measures were robust. The ASI-3 demonstrated satisfactory internal consistencies and relationships with other variables that are largely as expected from prior research suggesting that this measure was adequate for the current study. Factor analysis of the ASI-3 measure however, gave less than optimum results suggesting that this measure requires further validation studies with older adults.

Implications of findings for the Cognitive Model and Older Adults

The cognitive model originated from theories of anxiety and hypothesises that health anxiety arises from a reciprocal relationship between beliefs about and (hyper)vigilance to bodily symptoms (Salkovskis, 1996). Others hypothesise that a tendency to amplify benign symptoms is a core feature of health anxiety and should also be included in the model (e.g. Marcus et al., 2007). The present study examined the association between these body perception variables and health anxiety. Findings indicted that, partially replicating other studies (e.g. Gerolimatos & Edelstein, 2012b; Wheaton et al., 2010), the anxiety constructs of body vigilance and anxiety sensitivity predicted health anxiety for both groups. In the older adult group, worry was a significant predictor in all of the models tested, providing further evidence of the strong relationships between health worry, GAD and older age (e.g. Hunt et al., 2009). These findings provide further evidence that health anxiety shares features with other anxiety disorders in both young and older adults, and that worry may be a more salient feature in older adults when compared with

their younger counterparts. Additionally, the findings showed support for the amplification of symptoms as part of health anxiety symptomology in both groups (e.g. Barsky et al., 1991), although it appears that similar to other findings (e.g. Fergus & Valentiner, 2010) this may be a lesser feature of health anxiety than anxiety sensitivity and body vigilance, particularly in the younger group.

A detailed inspection of results provides a more nuanced interpretation. First, as predicted by cognitive theories, it seems that body vigilance is the most important feature of health anxiety for both young and older adults. This is aligned with cognitive theories of health anxiety that emphasise the importance of self-monitoring in the development and maintenance of health anxiety. The role of anxiety sensitivity or beliefs about anxiety sensations is less clear. As found in previous work, and as expected from the cognitive model, beliefs about physical sensations were an important predictor of health anxiety for younger adults (e.g. Wheaton et al., 2010) and older adults. For older adults however, when the body vigilance variable entered the equation, the cognitive sensations dimension of anxiety sensitivity emerged as a predictor. As detailed above, this may be due to an underlying cohort differences in the relationship between anxiety sensitivity and body vigilance.

The role of somatosensory amplification in the prediction of health anxiety is equally problematic to explain, largely because there is no prior research that considers a combination of anxiety and amplification constructs within a cognitive framework. When considering the SSAS measure alone, the percentage of variance added to the model was low and similar for both groups. When all of the body perception constructs were considered, the regression analysis with the younger cohort showed a clear hierarchy, with the amplification variable being much less important as a predictor in the model when compared with the anxiety constructs. Equally, amplification appeared to be more important than anxiety sensitivity in the older cohort. Within the cognitive model, this could be interpreted as a difference in the attention processes between the two age cohorts. It may be that as a person ages, attention to bodily sensations include both benign and illness related sensations. This is supported by research showing age related decline in ability to differentiate between benign and threatening sensations (e.g. Hart 1990).

As noted above, body vigilance was the most important predictor of health anxiety. Since the BVS measure excluded non-autonomic symptoms this could represent an underestimate of the relationships. With this in mind, an adapted version, BVS-H, was

piloted. Congruent with expectations of the cognitive model, the BVS-H predicted health anxiety in both groups. Contrary to expectations however, BVS-H was not a better predictor than the original BVS measure in both groups. This provides tentative support for the hypothesis that these non-clinical cohorts, did not differentiate between non-autonomic symptoms and autonomic symptoms. This is similar to research with hypochondriasis patients (e.g. Walker & Furer, 2008) showing that patients found all symptoms threatening.

Integrating these findings is complex. There are subtle differences between the two groups in the variables that contribute to health anxiety, which as the CALTAP model suggests, may be due age cohort effects not accounted for in this study. These results suggest however, that age related modifications in beliefs and attention together with an increased influence of current emotional state, particularly worry, may be part of these differences.

Clinical Utility of the Study

The current study makes several clinically significant contributions to the literature. First, the study has provided further evidence that while a majority of older adults are not health anxious a significant minority are, and health anxiety is possibly as important as other anxiety disorders in older adults.

Second, the current study has demonstrated that body vigilance is the most important factor in predicting health anxiety in both cohorts. This has implications in treatment for health anxiety. Treatment based on cognitive behavioural principles is considered the "most promising" intervention for health anxiety (Taylor & Asmundson, 2004) and has been shown to be more effective than other therapeutic approaches such as behavioural stress management and psychodynamic psychotherapies (e.g., D. M. Clark et al., 1998; Sorensen, Birket-Smith, Wattar, Buemann, & Salkovskis, 2011). Given the hypothesised importance of vigilance in the genesis and maintenance of health anxiety, several writers have suggested interoceptive exposure as an effective treatment for health anxiety (Abramowitz & Braddock, 2008; Taylor & Asmundson, 2004; Walker & Furer, 2008).

Interoceptive exposure is controlled induction of feared bodily sensations. Typical examples are hyperventilation to produce dizziness and breathing through a narrow straw to produce breathlessness. Continued exposure to these feared sensations gradually reduces anxious appraisals of their meaning and thence health anxiety. Identification of

the feared sensations is essential in treatment planning. Findings of the current study suggest that both the BVS and BVS-H scales have utility in identification and ongoing assessment of feared sensations for both age groups. Additionally, the strength of the relationship between body vigilance and health anxiety for both groups suggest that interoceptive exposure might be a valuable initial intervention in health anxiety treatments for all age groups.

Next, the relationships between worry and health anxiety in the older cohort pose the intriguing possibility that treatment of health anxiety should take priority for older adults with health anxiety and GAD symptoms. Pain was a significant predictor for both groups, suggesting that pain management may also have utility in the treatment of health anxiety. Controlled treatment studies are essential with a range of age groups to verify the utility of these suggestions.

Finally, the study has provided valuable evidence about the utility of various measures in an older adult population. Analyses have demonstrated that health anxiety, body vigilance and amplification measures used in the current study are useful for older adults. While these measures may not capture the full spectrum of experience of health anxiety in an older adult, they do appear to have utility as measures for this population. The evidence is less clear for the ASI-3 however. It seems that this measure may not be a suitable measure for older adults because of complexity and cognitive load when completing the measure.

As noted in Chapter 3, the SSAS might have particular utility for older adults because it is simple to administer and the items do not overlap with physical illness. In the current study, the SSAS had the lowest level of missing data, indicating its suitability and easy comprehension for the older adult cohort. Moreover, the measure had a similar factor structure to the younger cohorts. Finally, although less than the BVS, scores on this measure significantly predicted of health anxiety for older adults ahead of the anxiety sensitivity measure. This however, was not true for the younger cohort. Taken together, these factors suggest that the SSAS may be a useful, brief, proxy screen for health anxiety with older adults but less useful in younger cohorts. This suggestion should however take into consideration, that SSAS may not differentiate between health anxiety and other disorders (Speckens, 2001) nor be a useful measure of therapeutic change (e.g., Barsky et al., 1998; Langlois & Ladouceur, 2004).

Study Strengths and Limitations

Strengths of the study were first, this study was conducted within a coherent theoretical framework. Second, inclusion of a younger group allowed examination of differences between young and older adults in variables contributing to health anxiety. Third, the comprehensive nature of the survey questionnaire provided a thorough examination of factors contributing to health anxiety. Finally, the sample size was sufficient to permit factor analysis of the health anxiety and body perception measures for the older cohort, which strengthened the conclusions of the study.

There were limitations to the study, which lessen the generalisability of the results, but also suggest further avenues for research. Although the goal of the current study was to provide comparisons between adult cohorts with extreme age differences, the cross-sectional methodology does not allow strong conclusions about the role of age in these differences, nor does it permit inferences about causality. In common with many studies of this type, the older cohort was a self-selected sample biased toward a health active and well resourced group (Moraitou & Efklides, 2007) and the younger group was predominantly a student population. In addition, neither group reflected the cultural and ethnic diversity of the New Zealand population. Nonetheless, analysis showed that in common with other research, demographic factors had very little effect on relationships studied (Creed & Barsky, 2004), implying that this limitation may not have severely impacted the ecological validity of results. Self-selected samples are inherently non-representative. Participants may for example, be biased towards those with high levels of motivation and low distress levels. More rigorous participant selection procedures should be considered in any future studies.

The survey population chosen was a non-clinical group, which was reflected in the bias of scores towards the low distress end of the spectrum. Nevertheless, health anxiety is considered to be on a continuum, and studies with non-clinical participants should lead to similar conclusions to those with clinical cohorts. This is borne out in results from studies comparing clinical and non-clinical samples, which demonstrate that the relationship between variables show similar patterns for both groups (e.g., Olatunji et al., 2007). This implies that this drawback may not have significantly affected the conclusions. Replicating the study with a clinical sample would strengthen the findings of the current study.

Observed differences in scores and regression relationships could be due to changes attributable to the aging process or cohort differences. Social and historical

influences on a particular age group have produced norms of health beliefs and attitudes that may differ across age groups (Zarit & Zarit, 2007). Cohort specific effects for older adults include, different understandings of mental distress, attributing symptoms to age not illness and under reporting of negative feelings (Lawrence et al., 2006; Pinquart, 2001; Zarit & Zarit, 2007). All of these factors could have lead to underreporting of scores on the various psychological measures under study. Uniformity between health anxiety scores in the current study and those reported by Boston and Merrick (2010) with a similar cohort of older people, suggests that these cohort effects are, at least, consistent across this cohort of older New Zealanders. Further, similar results have been reported in other health anxiety research in older adults, thereby providing further evidence for the legitimacy of conclusions reached here. A longitudinal investigation would clarify the role of cohort effects and aging in the relationships.

The current study considered participants over 65 as a homogeneous group. Cohort differences may also exist within the over 65 group, for example early life experiences of those over 80 would include the great depression and Second World War, whereas these world events would have had a lesser influence on the 'young old'. The current study could be strengthened by analysing differences across specific age groups in the older cohort.

There were potential measurement difficulties. Fixed order presentation of survey elements may have affected responses due to fatigue and other effects. There was also possible confounding, as the BVS comprises items that may reflect actual illness rather than vigilance per se. This possibility was overcome in part by controlling for physical health in the regression analysis. Objective measurement of physical illness presented particular challenges in this self-report study. As noted in earlier chapters, accounting for the objective effects of comorbidity is especially difficult. Although aggregate number of illnesses is a commonly used instrument, obtaining greater detail of the degree and duration of illness may have enhanced the sensitivity of the measure and improved the estimation of the effects of physical illness in health anxiety.

A particular dilemma in the current study was that none of the measures had been specifically validated in an older cohort. This shortcoming was overcome to some extent by providing factor analysis of psychological measures, which showed that all, with the possible exception of the ASI-3, were factorially valid measures for the older cohort. This did not however compensate for possible confirmatory bias in the measures. Confirmatory

bias occurs when the measure only offers a limited selection of response sets that may not reflect crucial aspects of the individual's experience. This is most marked in older adult research because most measurement instruments have been developed from item pools relevant to younger populations, which do not necessarily reflect the concerns of older adults (Roberts, 2010).

Future Directions

The current study has provided new evidence that the cognitive behavioural model of health anxiety has relevance to older adults. There were, however, anomalies in the relationship between anxiety sensitivity and health anxiety. A replication study could provide more clarity about this relationship. The study could include measures of worry validated for older adults to 'tease out' the relationships between worry, anxiety sensitivity and health anxiety. Addition of other constructs such as intolerance of uncertainty would provide further information about the relationship between anxiety constructs, worry and health anxiety.

The most recently published study of health anxiety in older adults investigated the relationship of anxiety sensitivity and intolerance of uncertainty as mediators between health anxiety and age (Gerolimatos & Edelstein, 2012a). The work of these authors could be extended to include body vigilance and somatosensory amplification as mediators. Other researchers have identified the importance of obsessive compulsive symptoms (e.g., Deacon & Abramowitz, 2008) and thanatophobia (Hiebert, Furer, McPhail, & Walker, 2005) in health anxiety. Future research could investigate the contribution of these factors in the presentation of health anxiety in older adults. Replication of experimental cognitive process studies would give valuable insight into process factors in health anxiety in older cohorts. Treatment studies with older adults would also provide evidence of the utility of cognitive behavioural treatment protocols for health anxiety.

Health anxiety on older populations remains understudied and there are many unanswered questions. Given the apparently ubiquitous nature of health anxiety in clinical populations of older adults, it would be useful to extend this study into a primary care setting. This would provide further evidence of the relationships between the cognitive constructs and health anxiety in older adults. Having useful and reliable tests of health anxiety are useful clinical tools; a study in primary care would provide further evidence of the clinical utility of the measures used here. Although the results of the current study indicate that the SHAI is a valid measure in the population, examining the phenomenology

of health anxiety in older adults across clinical and non-clinical settings would provide invaluable clinical information and inform the development of age appropriate measures.

Expression of somatic concerns differs across cultures (Kirmayer & Young, 1998). The ethnic homogeneity of the samples was a particular limitation of the current study and most studies to date. Future studies with a wider cultural and ethnic mix would provide a more rigorous test of the validity of results of the current study. Maori (the indigenous people of New Zealand) and Pacific peoples are over-represented in mental health statistics in New Zealand (Oakley Browne et al., 2006) and discovering more about health anxiety in these populations would be invaluable.

Executive Summary

Hypochondriasis has been the subject of study for over two thousand years, while the related concept of health anxiety has a relatively short history. Under current nosologies, a diagnosis of hypochondriasis is rare; however, health anxiety is highly prevalent and contributes to a multitude of poor health outcomes. A burgeoning population of older adults in western societies is increasing interest in the experience of psychological distress in this cohort. Very little is known about health anxiety and hypochondriasis in older adults and there is conflicting evidence as to whether older adults are more vulnerable to health anxiety than their younger counterparts. The primary purpose of the present study was to contribute to the emerging knowledge about health anxiety in older adults. This was achieved by conducting a self-report survey of two groups of adults, one under 30 years and the other over 65. The study was conducted within a cognitive framework and was comprised of three investigations. First, predictors of health anxiety were examined. These results were supported by a preliminary factor analysis of critical psychometric measures not previously validated for an older population. Finally, an improved measure of attention to bodily sensations was piloted.

The most noteworthy finding was that the cognitive theory of health anxiety is useful as an explanatory model of health anxiety in older adults. As predicted by cognitive theory, vigilance to bodily sensations was the strongest predictor of health anxiety for both groups. Second, the amplification of bodily sensations might be more important for older than younger adults in the presentation of health anxiety. Third, it seems that the presence of worry strongly influences health anxiety in older adults, an effect not found in the younger group. The relationship of anxiety sensitivity in health anxiety for older adults was more ambiguous, with suggestions that the interrelationships between health anxiety,

anxiety sensitivity and body vigilance differed in some way for older adults. Several possible explanations were offered which require further study. In addition, physical health factors had unexpected influence in the prediction of health anxiety. Pain was a significant factor for both groups. Physical illness did not predict health anxiety in the older cohort, however surprisingly, was a predictor for the younger group and warrants further study. In concurrence with other recent studies and contemporary theories of aging, older adults reported lower levels of emotional distress than the younger cohort. In spite of generally low levels of health anxiety, there was however, a noteworthy minority of both groups that reported clinically significant health anxiety; signalling that health anxiety is potentially an important clinical issue.

Factor analysis of critical psychometric measures generally gave positive results, which in turn allowed greater confidence in the results of the regression analyses. The exception to this was the ASI-3 measure, which presented a number of difficulties. The measure had a high level of missing data and partial responses, which undermined the power of the factor analysis and may have contributed to the less than satisfactory results. Secondary considerations such as complex instructions and the older age of participants who failed to complete the measure, indicated that the ASI-3 measure may not be suitable for older adults in self-report studies.

Last, a body vigilance measure for health anxiety was piloted, which did not give any significant improvement over the original BVS measure. It was however factorially coherent which suggests that it might be useful as an assessment tool for health anxiety.

Placing these findings into the clinical sphere provides exciting possibilities for intervention and research. The importance of body vigilance in the prediction of health anxiety, suggests that similar to panic, interventions such as interoceptive exposure could be a valuable feature of therapy for health anxiety. Similarly, the contribution of pain to health anxiety advocates for pain management as a feature of health anxiety therapy. When considering older adults, GAD symptoms (worry) were important predictors of health anxiety. This probable overlap of symptoms implies that treatment for GAD and health anxiety in older adults should have common features and that screening for health anxiety should be included in assessment for older adults. The health anxiety, amplification and both body vigilance measures used in the present study are suitable for assessment of health anxiety in older adult cohorts. Intervention research would provide additional indications of their usefulness as measures of therapeutic change.

In conclusion, the present study has achieved the primary goal of contributing to the under researched area of health anxiety in older adult populations. This study has provided further evidence of the relevance of the cognitive model of health anxiety to older adults, together with new evidence of similarities and differences in contributing factors to health anxiety among older and younger cohorts in New Zealand. Additionally, the current study has provided preliminary evidence of factorial validity of health anxiety measures in the older adult cohort. It is hoped that these findings will add to the understanding and assessment of health anxiety in older adults and inspire other to pursue research in this appealing and under researched topic.

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APPENDICES

APPENDIX A - PERSONAL CORRESPONDENCE

Appendix A 1: Email correspondence from Professor Anita Stewart

Dear Ann

You don't need permission to use any of the Medical Outcomes Study measures. However, there are many versions of each concept such as physical function. I suggest that you look at these. The 10-item physical functioning measure is described in detail in:

Stewart AL, Kamberg CJ. Physical functioning measures. In: Stewart AL, Ware JE, Jr., eds. Measuring Functioning and Well-being: The Medical Outcomes Study Approach. Durham, NC: Duke University Press; 1992:345-371.

This scale is also part of the SF-36, thus all publications on the SF-36 are relevant for your work.

All of the Medical Outcomes Study (MOS) measures are posted on the RAND website on health surveys http://www.rand.org/health/surveys.html

Good luck with your work,
Anita Stewart

-----Original Message-----
From: Ann.Boston.1@uni.massey.ac.nz
[mailto:Ann.Boston.1@uni.massey.ac.nz]
Sent: Thursday, July 22, 2010 3:28 AM
To: Stewart, Anita
Subject: Query from doctoral student re: MOS Physical function measure

Dear Professor Stewart

I am a doctoral student in clinical psychology at Massey University Auckland New Zealand and part of Associate Professor Paul Merrick's team studying anxiety among older people. My research interest is the study of health anxiety in an older population.

I am currently seeking a measure of physical function to use in my study.
From my literature search, I think that the MOS physical function measure could be appropriate as my study population will be relatively active older people.

The purpose of this correspondence is to find out who I need to approach to obtain permission to use the measure and where I might obtain the scoring information.

Thank you in anticipation of your help

Regards
Ann Boston

Appendix A 2: Email correspondence with Professor Taylor

OK, sure, here's the scale.

At 03:24 PM 5/30/2010, you wrote:

Dear Professor Taylor

The purpose of this correspondence is to request your permission to use your measure of Anxiety Sensitivity ASI-3 (Taylor et al., 2007) in my doctoral study.

I am a clinical psychology doctoral student at Massey University Auckland New Zealand and part of Associate Professor Paul Merrick's team studying anxiety among older people. My research interest is the study of health anxiety in an older population.
My doctoral research extends an exploratory study carried out by A/Prof Merrick and myself (Boston & Merrick, 2010).

I note that questionnaire items are printed in the publication, but would appreciate some guidance regarding the wording of instructions.
I would also value any comment that you may have regarding on the use of ASI-3 in a population of adults aged over 65.

I will of course acknowledge your assistance in my thesis and share any relevant findings with you.

Thank you in anticipation of your assistance.

Regards

Ann Boston

References

Boston, A. F., & Merrick P. L. (2010) Health anxiety among older people: an exploratory study of health anxiety and safety behaviors in a cohort of older adults in New Zealand. International Psychogeriatrics, 22, 549-588.

Taylor, S., Zovlensky, M. J., Cox, B. J., Deacon, B., Heimberg, R. G., Ledley, D. R., et al. (2007). Robust dimensions of Anxiety Sensitivity: Development and initial validation of the Anxiety Sensitivity Index-3. Psychological Assessment, 19, 176-188.

Appendix A 3: email correspondence with Professor Schmidt

Ann

I'm happy to have you use the measure - as far as I know, no one has evaluated the BVS in an older adult sample

Best of luck with your research

Brad

Quoting Ann.Boston.1@uni.massey.ac.nz:

>
>
> Dear Professor Schmidt
>
>
> I am a doctoral student in clinical psychology at Massey University
> Auckland New Zealand and part of Associate Professor Paul Merrick's
> team studying anxiety among older people. My research interest is the
> study of health anxiety in an older population.
> My doctoral research extends an exploratory study carried out by
> A/Prof Merrick and myself (Boston & Merrick, 2010).
>
> The purpose of this correspondence is to:
> 1. Request your permission to use your measure of body vigilance
(BVS;
> Schmidt, Lerew & Trakowski, 1997) in my doctoral study.
>
> 2. I note that questionnaire items are printed in the publication,
but
> would value any comment that you may have regarding on the use of BVS
> in a population of adults aged over 65.
>
> I will of course acknowledge your help in my thesis and share any
> relevant findings with you.
>
> Thank you in anticipation of your assistance.
>
> Regards
>
> Ann Boston
>
> References
> Boston, A. F., & Merrick P. L. (2010) Health anxiety among older
people:
> an exploratory study of health anxiety and safety behaviors in a
> cohort of older adults in New Zealand. International
Psychogeriatrics, 22, 549-588.
>
> Schmidt, N. B., Lerew, D. R., & Trakowski, J. H. (1997). Body
> Vigilance in Panic Disorder: Evaluating Attention to Bodily
> Perturbations. Journal of Consulting & Clinical Psychology, 65(2),
214-220.

This message was sent using IMP, the Internet Messaging Program, at the Florida State University Department of Psychology.

Appendix A 4: Email correspondence with Professor Barsky

Dear Ms. Boston

I would be delighted for you to use the Somatosensory Amplification Scale in your research suggests. I hope it proves useful and would be interested to learn your findings. Good luck.

Arthur Barsky

Arthur J. Barsky, M.D.
Professor of Psychiatry, Harvard Medical School Vice Chair for Psychiatric Research, Brigham & Women's Hospital
75 Francis Street
Boston, MA 02115
Phone: 617-732-5236
Fax: 617-278-6907
abarsky@partners.org

-----Original Message-----
From: Ann.Boston.1@uni.massey.ac.nz
[mailto:Ann.Boston.1@uni.massey.ac.nz]
Sent: Thursday, June 03, 2010 6:27 PM
To: Barsky, Arthur Joseph,III,M.D.
Subject: request to use SSAS in doctoral study

Dear Professor Barsky

The purpose of this correspondence is to request your permission to use your measure of Somatosensory amplification in my doctoral study.

I am a clinical psychology doctoral student at Massey University Auckland New Zealand and part of Associate Professor Paul Merrick's team studying anxiety among older people. My research interest is the study of health anxiety in an older population.

My doctoral research extends a preliminary study carried out by A/Prof Merrick and myself (Boston & Merrick, 2010).
I would also value you comment on the suitability of SSAS for use with a population over 65.

I will of course acknowledge your assistance in my thesis and share any relevant findings with you.

Thank you in anticipation of your support.
Regards
Ann Boston
References Boston, A. F., & Merrick P. L. (2010) Health anxiety among older people: an exploratory study of health anxiety and safety behaviors in a cohort of older adults in New Zealand. International Psychogeriatrics, 22, 549-588.

Appendix A 5: Email correspondence with Professor Salkovskis

Subject	**RE: request from doctoral student re: use of SHAI**
From	Anderson, Lesley
To	Ann.Boston.1@uni.massey.ac.nz
Sent	Tuesday, 8 June 2010 9:16 p.m.

Dear Ann,

Thanks for your message. Professor Salkovskis is happy to give his permission for you to use the SHAI measure again.

Best wishes for your research.

Regards,
Lesley

-----Original Message-----
From: Ann.Boston.1@uni.massey.ac.nz
[mailto:Ann.Boston.1@uni.massey.ac.nz]
Sent: 03 June 2010 23:02
To: Anderson, Lesley
Subject: request from doctoral student re: use of SHAI

Dear Professor Salkovskis

You may recall that you gave permission in 2008 to use the SHAI measure in my Masters study. The results of this preliminary study have recently been published (Boston & Merrick 2010).
I am now a clinical psychology doctoral student at Massey University Auckland New Zealand, under the supervision of Associate Professor Paul Merrick.
My doctoral research is a continuation of my study of health anxiety among an older population and I am once again seeking your permission to use the SHAI measure.

I will of course acknowledge your assistance in my report and share any relevant findings with you.

Regards
Ann Boston
Reference
Boston, A. F., & Merrick P. L. (2010). Health anxiety among older people:
an exploratory study of health anxiety and safety behaviors in a cohort of older adults in New Zealand. International Psychogeriatrics, 22, 549-588.

APPENDIX B - STUDY SURVEY DOCUMENTS

Appendix B 1: Information sheet

MASSEY UNIVERSITY
COLLEGE OF HUMANITIES
AND SOCIAL SCIENCES
TE KURA PŪKENGA TANGATA

Information Sheet

You are invited to participate in a study of reactions to health and illness.

Who is carrying out the study?
I am Ann Boston, a Doctoral Student in Clinical Psychology at the School of Psychology at Massey University, Albany. Associate Professor Paul Merrick and Dr Jennifer Stillman are supervising the project.

What is the study about and how do I participate?
My study is designed to compare how people of different ages react to and think about particular health challenges. I am surveying two groups; one under 30 years and the other 65 years and over. Participants will be asked to complete an anonymous questionnaire focusing on their health; this will take approximately 25 minutes to complete. Questionnaires will be returned by mail in the freepost envelope provided. All participants will be offered a summary of the findings at the conclusion of the study.

Is the survey confidential?
This study is absolutely confidential. The questionnaire is anonymous and your replies will be coded with identification numbers to prevent identification of individuals, kept in a secure location and destroyed after 5 years. All information collected during the study will be kept strictly confidential and only accessed by the researcher and supervisors directly involved in the study. No material which could personally identify you will be used in any reports on this study.
The information collected will be used for the research project and may be submitted for publication in an academic journal.

Who is able to take part?
If you are

- **Aged 18 – 30 years OR 65 years and over and living independently** (that is, not in a nursing home or hospital).
- able to read and write in English
- willing to complete a short questionnaire about your health.

you will be able to participate in this study.

Participant's rights
Completion and return of the questionnaire implies consent.
You have the right to decline to answer any of the questions.

If at any time you have questions or concerns about this study, please contact

Ann Boston	email:	Ann.Boston.1@uni.massey.ac.nz
Dr Paul Merrick	telephone	(09) 4140800 extension 41231
	email	P.L.Merrick@massey.ac.nz

Thank you in anticipation of your support.

Ann Boston

This project has been reviewed and approved by the Massey University Human Ethics Committee: Northern, Application 10/049. If you have any concerns about the conduct of this research, please contact Dr Ralph Bathurst, Chair, Massey University Human Ethics Committee: Northern, telephone 09 414 0800 x 9570, email humanethicsnorth@massey.ac.nz.

Te Kunenga
ki Pūrehuroa

School of Psychology – Te Kura Hinengaro Tangata
Private Bag 102904, North Shore Mail Centre, Auckland 0745, New Zealand T +64 9 414 0800 extn 41244 F +64 9 414 0813
www.massey.ac.nz

REACTIONS TO HEALTH AND ILLNESS SURVEY

How to complete this survey:

- Use black or blue pen.
- Mark your response clearly with a tick.
- When asked to write a response, please write clearly.
- If you make a mistake, put a cross over the incorrect response and tick your new answer.

PLEASE READ THIS

- **All of the information you give us is in confidence and will be used only for the purposes of this study.**
- **There are no right or wrong answers; we want the response that is best for you.**
- **Do not spend too long on each question; your first response is usually the best.**
- **Completion and return of the survey implies consent to take part in this study.**
- **You have the right to decline to answer any particular question.**

When you have completed the survey please return it in the freepost envelope supplied.

Thank you for participating in this study.

Please turn to next page to commence

BACKGROUND INFORMATION

These questions give us some general information about you.

Q1. What is your date of birth? Month_____ Year_____

Q2. Are you? Male ☐ Female ☐

Q3. Where do you live (town /city)**?** _____

Q4. Do you live in a retirement village? Yes ☐ No ☐

Q5. Which ethnic group do you identify with?
(Please tick all that apply to you)

Pakeha/New Zealander of European descent ☐
Maori ☐
Samoan ☐
Cook Island Maori ☐
Tongan ☐
Niuean ☐
Chinese ☐
Indian ☐
Other please specify

_____

Q6. What is your relationship status? (Please tick one box)

I am married ☐
I am in a de facto/partnered relationship ☐
I am separated or divorced ☐
I am a widow or widower ☐
I have never been married ☐

Q7. How many people live with you (excluding yourself)**?**

_____

Q8. What is your highest qualification? (Please tick one box)

No qualifications ☐
Secondary school qualification ☐
Trade qualification ☐
University degree ☐
Other qualification, please specify

Q9. Are you? (Please tick all that apply)

A student ☐ In full time paid work ☐ In part time paid work ☐ Retired ☐

Other (please specify) _____

Q10. How well does your total income meet your everyday needs for such things as accommodation, food, clothing, and other necessities? (Please tick one box)

My income is not enough ☐
My income is just enough ☐
My income is enough ☐
My income is more than enough ☐

Q11. These are some questions about your thoughts on becoming older
(Please tick one box in each line).

	True	False
Things keep getting worse as I get older	☐	☐
I have as much energy as I did last year	☐	☐
As you get older, you are less useful	☐	☐
I am as happy now as I was when I was younger	☐	☐

	Better	Same	Worse
As I get older, things are (better/same/worse) than I thought they would be	☐	☐	☐

Q12. The next questions ask you how sensitive you are to internal body sensations such as heart palpitations or dizziness.
Fill it in according to how you have felt IN THE PAST 6 MONTHS.
(Please tick the box with the number that best describes you)

a. I am the kind of person who pays close attention to internal body sensations

0	1	2	3	4	5	6	7	8	9	10

Not at all like me Extremely like me

b. I am very sensitive to changes in my internal bodily sensations

0	1	2	3	4	5	6	7	8	9	10

Not at all like me Extremely like me

c. On average, how much time do you spend each day 'scanning' your body for sensations (e.g., sweating, heart palpitation, dizziness)?

0	1	2	3	4	5	6	7	8	9	10

No time All of the time

d. Rate how much attention you pay to each of the following sensations on the following scale. (Please tick one number on each line that best describes you)

	none					moderate					a lot
Heart palpitations	0	1	2	3	4	5	6	7	8	9	10
Chest pain/discomfort	0	1	2	3	4	5	6	7	8	9	10
Numbness	0	1	2	3	4	5	6	7	8	9	10
Tingling	0	1	2	3	4	5	6	7	8	9	10
Short of breath/smothering	0	1	2	3	4	5	6	7	8	9	10
Faintness	0	1	2	3	4	5	6	7	8	9	10
Vision changes	0	1	2	3	4	5	6	7	8	9	10
Feelings of unreality	0	1	2	3	4	5	6	7	8	9	10
Feeling detached from self	0	1	2	3	4	5	6	7	8	9	10
Dizziness	0	1	2	3	4	5	6	7	8	9	10
Hot flush	0	1	2	3	4	5	6	7	8	9	10
Sweating/clammy hands	0	1	2	3	4	5	6	7	8	9	10
Stomach upset	0	1	2	3	4	5	6	7	8	9	10
Nausea	0	1	2	3	4	5	6	7	8	9	10
Choking/throat closing	0	1	2	3	4	5	6	7	8	9	10

e. Rate how much attention you pay to each of the following sensations on the following scale (Please tick one number on each line that best describes you)

	none					moderate					a lot
Headache	0	1	2	3	4	5	6	7	8	9	10
Fatigue/tiredness	0	1	2	3	4	5	6	7	8	9	10
Joint, limb or Back pain	0	1	2	3	4	5	6	7	8	9	10
Skin discolouration or rashes	0	1	2	3	4	5	6	7	8	9	10
Stomach pain	0	1	2	3	4	5	6	7	8	9	10
Gas or indigestion	0	1	2	3	4	5	6	7	8	9	10

PHYSICAL HEALTH

The following questions are about your physical health

Q13. In general, would you say your health is: (Please tick one box)

Excellent ☐ Very good ☐ Good ☐ Fair ☐ Poor ☐

Q14. Please read the following list of activities and tell us: in a typical day does your health now limit you in these activities. If so how much?

(Please tick one box in each line)

	Yes, limited a lot	Yes, limited a little	No, not limited at all
Vigorous activities – such as running, lifting heavy objects, participating in strenuous sport	☐	☐	☐
Moderate activities - such as moving a table, pushing a vacuum cleaner, playing bowls	☐	☐	☐
Lifting or carrying groceries	☐	☐	☐
Climbing several flights of stairs	☐	☐	☐
Climbing one flight of stairs	☐	☐	☐
Bending, kneeling or stooping	☐	☐	☐
Walking more than one kilometre	☐	☐	☐
Walking several blocks	☐	☐	☐
Walking one block	☐	☐	☐
Bathing or dressing yourself	☐	☐	☐

Q15. How satisfied are you with your physical ability to do what you want to do?

(Please tick one box)

- Completely satisfied ☐
- Very satisfied ☐
- Somewhat satisfied ☐
- Very dissatisfied ☐
- Completely dissatisfied ☐

Q16. When you travel around your community does someone have to help you because of your health? (Please tick one box)

- Yes, all of the time ☐
- Yes, most of the time ☐
- Yes, some of the time ☐
- Yes, a little bit of the time ☐
- No, none of the time ☐

Q17. Are you in bed or a wheelchair for most or all of the day because of your health?

(Please tick one box)

- Yes, every day ☐
- Yes, most days ☐
- Yes, some days ☐
- Yes, occasionally ☐
- No, never ☐

Q18. How much bodily pain have you had during the past 4 weeks?
(Please tick one box**)**

None ☐ Very mild ☐ Mild ☐ Moderate ☐ Severe ☐ Very severe ☐

Q19. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)? (Please tick one box)

Not at all ☐ Slightly ☐ Moderately ☐ Quite a bit ☐ Extremely ☐

Q20. How *TRUE* or *FALSE* is each of the following statements for you?
(Please tick one box on each line)

	definitely true	mostly true	don't know	mostly false	definitely false
I seem to get sick a little easier than other people	☐	☐	☐	☐	☐
I am as healthy as anybody I know	☐	☐	☐	☐	☐
I expect my health to get worse	☐	☐	☐	☐	☐
My health is excellent	☐	☐	☐	☐	☐

Q21. Please indicate the degree to which each of the following statements is true of you in general. (Please tick one box in each line)

	definitely true	mostly true	moderately true	a little bit true	not at all true
I can't stand smoke, smog or pollutants in the air	☐	☐	☐	☐	☐
I am often aware of various things happening within my body	☐	☐	☐	☐	☐
When I bruise myself it stays noticeable for a long time	☐	☐	☐	☐	☐
I can sometimes feel the blood flowing in my body	☐	☐	☐	☐	☐
Sudden loud noises really bother me	☐	☐	☐	☐	☐
I can sometimes hear my pulse or my heartbeat throbbing in my ear	☐	☐	☐	☐	☐
I hate to be too hot or too cold	☐	☐	☐	☐	☐
I am quick to sense hunger contractions in my stomach	☐	☐	☐	☐	☐
Even something really minor like an insect bite or splinter really bothers me	☐	☐	☐	☐	☐
I can't stand pain	☐	☐	☐	☐	☐

Q22. The following questions focus on <u>health problems</u> you may have.

Please tick the YES box if a doctor, nurse or other health care worker has ever told you that you have any of the following health problems.
Please tick the last box if you have been diagnosed with the condition WITHIN THE LAST 6 MONTHS

	Yes	Diagnosed within last 6 months
Asthma	☐	☐
Cancer	☐	☐
Diabetes	☐	☐
Epilepsy	☐	☐
High blood pressure of hypertension	☐	☐
Heart trouble (e.g., angina or myocardial infarction)	☐	☐
Irritable bowel syndrome	☐	☐
Bowel disorders (e.g., colitis or polyps)	☐	☐
Respiratory conditions (e.g. bronchitis, COPD or emphysema)	☐	☐
Chronic liver trouble (e.g., cirrhosis)	☐	☐
Stomach ulcers or duodenal ulcer	☐	☐
Hernia or rupture	☐	☐
Chronic kidney or urinary tract conditions	☐	☐
Chronic skin conditions (e.g., dermatitis, eczema or psoriasis)	☐	☐
Arthritis or rheumatism	☐	☐
Chronic fatigue syndrome	☐	☐
Sight impairment that cannot be corrected by glasses	☐	☐
Hearing impairment	☐	☐
Stroke	☐	☐
Osteoporosis	☐	☐
Depression or anxiety	☐	☐
Other mental health condition (e.g. schizophrenia or bipolar disorder)	☐	☐
Any other health condition (please name)		
_____	☐	☐
_____	☐	☐
Have you had any joint replacement surgery?	☐	☐

Have you seen a specialist doctor or other specialist health care worker and/ or been hospitalised for ONE OR MORE of the health conditions in question Q22?

Yes ☐ No ☐

If YES go to questions **Q23a and Q23b below**. If **NO** skip to question **Q24** ⇒

⇩

Please answer the following questions for the **TWO** health conditions that concern you most.

Q23a. Health condition no 1

Which health condition? _____

Which year were you diagnosed with this health condition? _____

How many times have you seen the specialist for this health condition?

None ☐ Once ☐, Twice ☐ More than three times ☐

How many times were you hospitalised for this health condition? _____times

Please give the total number of days spent in hospital for this health condition _____days

How much does this health condition worry you? (Please tick one box)

Not at all ☐ A little ☐ Somewhat ☐ Quite a lot ☐ A great deal ☐

Q23b. Health condition no 2

Which health condition? _____

Which year were you diagnosed with this health condition? _____

How many times have you seen the specialist for this health condition?

None ☐ Once ☐, Twice ☐ More than three times ☐

How many times were you hospitalised for this health condition? _____times

Please give the total number of days spent in hospital for this health condition _____days

How much does this health condition worry you? (Please tick one box)

Not at all ☐ A little ☐ Somewhat ☐ Quite a lot ☐ A great deal ☐

Q24. Please tick the box that best corresponds to how much you agree with each item. If any items concern something that you have never experienced (e.g. fainting in public) then answer on the basis of how you think you might feel *if you had* such an experience. Otherwise answer all items on the basis of your own experience.
(Please tick one box in each line.)

	very little	a little	some	much	very much
It is important for me not to appear nervous	☐	☐	☐	☐	☐
When I cannot keep my mind on a task, I worry that I might be going crazy	☐	☐	☐	☐	☐
It scares me when my heart beats rapidly	☐	☐	☐	☐	☐
When my stomach is upset, I worry that I might be seriously ill	☐	☐	☐	☐	☐
It scares me when I am unable to keep my mind on a task	☐	☐	☐	☐	☐
When I tremble in the presence of others, I fear what people might think of me	☐	☐	☐	☐	☐
When my chest feels tight, I get scared that I won't be able to breathe properly	☐	☐	☐	☐	☐
When I feel pain in my chest, I worry that I'm going to have a heart attack	☐	☐	☐	☐	☐
I worry that other people will notice my anxiety	☐	☐	☐	☐	☐
When I feel "spacey" or spaced out I worry that I may be mentally ill	☐	☐	☐	☐	☐
It scares me when I blush in front of people	☐	☐	☐	☐	☐
When I notice my heart skipping a beat, I worry that there is something seriously wrong with me	☐	☐	☐	☐	☐
When I begin to sweat in a social situation, I fear people will think negatively of me	☐	☐	☐	☐	☐
When my thoughts seem to speed up, I worry that I might be going crazy	☐	☐	☐	☐	☐
When my throat feels tight, I worry that I could choke to death	☐	☐	☐	☐	☐
When I have trouble thinking clearly, I worry that there is something wrong with me	☐	☐	☐	☐	☐
I think it would be horrible for me to faint in public	☐	☐	☐	☐	☐
When my mind goes blank, I worry there is something terribly wrong with me	☐	☐	☐	☐	☐

HEALTH WORRY

Q25. Each question is this section consists of a group of four statements. Please read each group of statements carefully and then select the one which best describes your feelings, OVER THE PAST SIX MONTHS.
Identify the statement by ticking the box next to it i.e. if you think that statement (a) is correct, tick statement (a).

1	(a) I do not worry about my health	☐
	(b) I occasionally worry about my health	☐
	(c) I spend much of my time worrying about my health	☐
	(d) I spend most of my time worrying about my health	☐
2.	(a) I notice aches/pains less than most other people (of my age)	☐
	(b) I notice aches/pains as much as most other people (of my age)	☐
	(c) I notice aches/pains more than most other people (of my age)	☐
	(d) I am aware of aches/pains in my body all the time	☐
3.	(a) As a rule, I am not aware of bodily sensations or changes	☐
	(b) Sometimes I am aware of bodily sensations or changes	☐
	(c) I am often aware of bodily sensations or changes	☐
	(d) I am constantly aware of bodily sensations or changes	☐
4.	(a) Resisting thoughts of illness is never a problem	☐
	(b) Most of the time I can resist thoughts of illness	☐
	(c) I try to resist thoughts of illness but am often unable to do so	☐
	(d) Thoughts of illness are so strong that I no longer even try to resist them	☐
5.	(a) As a rule I am not afraid that I have a serious illness	☐
	(b) I am sometimes afraid that I have a serious illness	☐
	(c) I am often afraid that I have a serious illness	☐
	(d) I am always afraid that I have a serious illness	☐
6.	(a) I do not have images (mental pictures) of myself being ill	☐
	(b) I occasionally have images of myself being ill	☐
	(c) I frequently have images of myself being ill	☐
	(d) I constantly have images of myself being ill	☐

7	(a) I do not have any difficulty taking my mind off thoughts about my health	☐
	(b) I sometimes have difficulty taking my mind off thoughts about my health	☐
	(c) I often have difficulty in taking my mind off thoughts about my health	☐
	(d) Nothing can take my mind off thoughts about my health	☐
8.	(a) I am lastingly relieved if my doctor tells me there is nothing wrong	☐
	(b) I am initially relieved but the worries sometimes return later	☐
	(c) I am initially relieved but the worries always return later	☐
	(d) I am not relieved if my doctor tells me there is nothing wrong	☐
9.	(a) If I hear about an illness I never think I have it myself	☐
	(b) If I hear about an illness I sometimes think I have it myself	☐
	(c) If I hear about an illness I often think I have it myself	☐
	(d) If I hear about an illness I always think I have it myself	☐
10.	(a) If I have a bodily sensation or change I rarely wonder what it means	☐
	(b) If I have a bodily sensation or change I often wonder what it means	☐
	(c) If I have a bodily sensation or change I always wonder what it means	☐
	(d) If I have a bodily sensation or change I must know what it means	☐
11.	(a) I usually feel at very low risk for developing a serious illness	☐
	(b) I usually feel at fairly low risk for developing a serious illness	☐
	(c) I usually feel at moderate risk for developing a serious illness	☐
	(d) I usually feel at high risk for developing a serious illness	☐
12.	(a) I never think I have a serious illness	☐
	(b) I sometimes think I have a serious illness	☐
	(c) I often think I have a serious illness	☐
	(d) I usually think that I am seriously ill	☐
13.	(a) If I notice an unexplained bodily sensation I don't find it difficult to think about other things	☐
	(b) If I notice an unexplained bodily sensation I sometimes find it difficult to think about other things	☐
	(c) If I notice an unexplained bodily sensation I often find it difficult to think about other things	☐
	(d) If I notice an unexplained bodily sensation I always find it difficult to think about other things	☐

14.	(a) My family/friends would say I do not worry enough about my health	☐
	(b) My family/friends would say I have a normal attitude to my health	☐
	(c) My family/friends would say I worry too much about my health	☐
	(d) My family/friends would say I am a hypochondriac	☐

For the following questions, please think about what it might be like IF you had a serious illness of a type which particularly concerns you (such as heart disease, cancer, multiple sclerosis and so on). If you do not have the illness, obviously you cannot know for certain what it would be like; please give your best estimate of what you <u>think</u> might happen, based on what you know about yourself and serious illness in general. (If you do have the illness, please tell us what it is like for you)

15.	(a) If I had a serious illness I would still be able to enjoy things in my life quite a lot	☐
	(b) If I had a serious illness I would still be able to enjoy things in my life a little	☐
	(c) If I had a serious illness I would be almost completely unable to enjoy things in my life	☐
	(d) If I had a serious illness I would be completely unable to enjoy life at all	☐
16.	(a) If I developed a serious illness there is a good chance that modern medicine would be able to cure me	☐
	(b) If I developed a serious illness there is a moderate chance that modern medicine would be able to cure me	☐
	(c) If I developed a serious illness there is a very small chance that modern medicine would be able to cure me	☐
	(d) If I developed a serious illness there is no chance that modern medicine would be able to cure me	☐
17.	(a) A serious illness would ruin some aspects of my life	☐
	(b) A serious illness would ruin many aspects of my life	☐
	(c) A serious illness would ruin almost every aspect of my life	☐
	(d) A serious illness would ruin every aspect of my life	☐
18.	(a) If I had a serious illness I would not feel that I had lost my dignity	☐
	(b) If I had a serious illness I would feel that I had lost a little of my dignity	☐
	(c) If I had a serious illness I would feel that I had lost quite a lot of my dignity	☐
	(d) If I had a serious illness I would feel that I had totally lost my dignity	☐

19. When answering the questions 15 to 18 (above)
Have you already been diagnosed with the serious illness that you were thinking about?

Yes ☐ No ☐

FEELINGS

Q26. Please read each statement and tick a number 0, 1, 2 or 3 which indicates how much the statement applied to you *over the past week*.
There are no right or wrong answers. Do not spend too much time on any statement.
The rating scale is as follows:
0 = Did not apply to me at all
1 = Applied to me to some degree, or some of the time
2 = Applied to me to a considerable degree, or a good part of time
3 = Applied to me very much, or most of the time

I found it hard to wind down	0	1	2	3
I was aware of dryness of my mouth	0	1	2	3
I couldn't seem to experience any positive feeling at all	0	1	2	3
I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
I found it difficult to work up the initiative to do things	0	1	2	3
I tended to over-react to situations	0	1	2	3
I experienced trembling (e.g., in the hands)	0	1	2	3
I felt that I was using a lot of nervous energy	0	1	2	3
I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
I felt that I had nothing to look forward to	0	1	2	3
I found myself getting agitated	0	1	2	3
I found it difficult to relax	0	1	2	3
I felt down-hearted and blue	0	1	2	3
I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
I felt I was close to panic	0	1	2	3
I was unable to become enthusiastic about anything	0	1	2	3
I felt I wasn't worth much as a person	0	1	2	3
I felt that I was rather touchy	0	1	2	3
I was aware of the action of my heart in the absence of physical exertion (e.g., sense of heart rate increase, heart missing a beat)	0	1	2	3
I felt scared without any good reason	0	1	2	3
I felt that life was meaningless	0	1	2	3

If you have any comments, please write them here.

_____

_____

_____

_____

_____

_____

_____

_____

Please note: If questions in the survey raise any health concerns for you, please discuss them with your family doctor or other health professional in the first instance. If this is not possible, then you may wish to contact the supervising clinician for this study Associate Professor Paul Merrick, Registered Clinical Psychologist.

telephone (09) 4140800 extension 41231

Email P.L.Merrick@massey.ac.nz

Thank you for participating in this survey

Please return it in the prepaid envelope supplied within 2 weeks

If you would like to receive a summary of the results (mail or e-email) please give your details below.
[Please note that the results summary may not be available until late 2012.]

To preserve your privacy:

- The envelope containing your questionnaire will *not* be opened by the researcher.
- Any email address, postal address or other personal information will be kept separately from your survey responses.
- Any email addresses, postal address or other personal information provided will **only** be used for the purpose of communicating a summary of results for this survey, and will not be shared with any other person or organisation.

Results: by mail

Name

_____

Postal address

_____

_____

_____

Alternatively: by email

Your e-mail address (please print)

_____

Appendix B 3: Sample participant request correspondence

[Massey University letterhead]

[Address]

28th September 2010

Dear

Research study

Further to our recent correspondence, please find enclosed a copy of the flier advertising my study and 20 questionnaire packs.

If you have any questions, please do not hesitate to contact me on *[phone contact and email here]*

Sincere thanks for your help with my research.

Yours sincerely

Ann Boston

Appendix B 4: Sample email participant request correspondence

Wanted: Research participants.

Sent Tue 23/11/2010 4:32 p.m.

Hello fellow doctoral student,

I am hoping that you will be able to help me. I have posted this request on *Stream* but have had no response as yet, so am hoping that this direct approach is more successful.

I am a doctoral student in clinical psychology at the Albany campus and I am looking for volunteers to help with my research.
I have almost completed data collection, but need more responses from people outside Auckland.

If you are aged between **18 and 30,** live outside Auckland, and are willing to complete a paper and pencil questionnaire about aspects of health, I would really appreciate your help.

The Information Sheet is attached and gives more information about the study.

If you are able to help me, please leave a postal address with my research assistant [email address here] to receive a copy of the questionnaire.

[*Please note:.* Your name and contacts will not be kept in any data file. All mailouts be dealt with by a research assistant and I will not have access to any of the contact information that you may provide.]

Regards
Ann Boston
DClinPsych Candidate
School of Psychology
Massey University
Albany

[Massey letter head]

Invitation to participate in research

Are you:

- **aged 65 years or over?**
- **living independently (that is, not living in a nursing home or hospital)?**
- **willing to complete a short questionnaire about your health?**

My name is Ann Boston, I am Doctoral student in Clinical Psychology at Massey University, and I am seeking volunteers to help me to complete my research project. I am conducting my project under the supervision of Associate Professor Dr Paul Merrick and Dr Jennifer Stillman.

I am part of a group of researchers who are interested in the psychology of older people, with the aim of increasing people's ability to deal with the challenges of aging.

My study is designed to compare how people of different ages react to and think about particular health challenges. Participants will be asked to complete an anonymous questionnaire focusing on their health; this will take approximately 20 minutes to complete. The survey will then be mailed back to me in the *freepost* envelope provided.

If you are interested in participating, further details of the study and questionnaire are available at the office.

If you have any questions please contact Ann Boston [phone number]

This project has been reviewed and approved by Massey University Human Ethics Committee(Northern) application no 10/049

SUPPLEMENTARY STATISTICS

APPENDIX C - SUPPLEMENTARY STATISTICS, FACTOR ANALYSIS

Appendix C 1

Group 1 – SHAI descriptive statistics current study data

Item	N	Skewness		Kurtosis	
			Std. Error		Std. Error
1. Worry about health	215	-.286	.166	.556	.330
2. Notice aches and pains	215	1.202	.166	.839	.330
3. Awareness of bodily sensations	214	.889	.166	.682	.331
4. Resisting thoughts of illness	213	.191	.167	-.551	.332
5. Fear of having serious illness	213	1.669	.167	1.924	.332
6. Imagining being ill	213	1.577	.167	1.039	.332
7. Distraction from health thoughts	214	1.134	.166	.068	.331
8. Doctor reassurance	211	3.084	.167	**11.653**	.333
9. Hear about illness	212	2.129	.167	2.557	.333
10.Meaning of bodily sensations	213	1.070	.167	2.043	.332
11. Risk of illness	214	.558	.166	-.529	.331
12. Thinking have serious illness	214	1.246	.166	-.020	.331
13. Distraction from bodily sensations	213	1.317	.167	1.466	.332
14. Family/friends	212	-1.183	.167	3.816	.333
15. Enjoy life with serious illness	211	.660	.167	.788	.333
16. Medical cure for serious illness	212	1.013	.167	1.080	.333
17. Life ruined by serious illness	211	1.265	.167	1.549	.333
18. Dignity lost by serious illness	209	.877	.168	-.277	.335

Appendix C 2

Group 1 - SHAI descriptive statistics combined data

	N	Skewness		Kurtosis	
			Std. Error		Std. Error
1. Worry about health	354	-.192	.130	1.275	.259
2. Notice aches and pains	354	1.263	.130	1.536	.259
3. Awareness of bodily sensations	353	.822	.130	.705	.259
4. Resisting thoughts of illness	352	.161	.130	-.519	.259
5. Fear of having serious illness	352	2.159	.130	5.391	.259
6. Imagining being ill	352	1.692	.130	2.999	.259
7. Distraction from health thoughts	353	1.551	.130	2.796	.259
8. Doctor reassurance	350	2.702	.130	**8.187**	.260
9. Hear about illness	351	1.989	.130	1.969	.260
10.Meaning of bodily sensations	352	1.224	.130	1.966	.259
11. Risk of illness	353	.651	.130	-.203	.259
12. Thinking have serious illness	353	1.501	.130	.997	.259
13. Distraction from bodily sensations	352	1.183	.130	.947	.259
14. Family/friends	351	-.915	.130	3.108	.260
15. Enjoy life with serious illness	350	.768	.130	.675	.260
16. Medical cure for serious illness	351	.964	.130	.957	.260
17. Life ruined by serious illness	350	1.474	.130	2.527	.260
18. Dignity lost by serious illness	348	.839	.131	.212	.261

Appendix C 3

Group 1 SHAI scale standardised parameter estimates, 2 factor, WLSMV estimator

Item	Estimate	S.E	Est./S.E.	P-Value
SHAI-IL BY				
1. Worry about health	0.746	0.042	17.729	0.000
2. Notice aches and pains	0.520	0.062	8.400	0.000
3. Awareness of bodily sensations	0.504	0.054	9.364	0.000
4. Resisting thoughts of illness	0.796	0.032	24.589	0.000
5. Fear of having serious illness	0.802	0.040	20.226	0.000
6. Imagining being ill	0.736	0.055	13.408	0.000
7. Distraction from health thoughts	0.827	0.045	18.532	0.000
8. Doctor reassurance	0.557	0.080	6.933	0.000
9. Hear about illness	0.605	0.083	7.269	0.000
10.Meaning of bodily sensations	0.622	0.057	10.936	0.000
11. Risk of illness	0.663	0.046	14.320	0.000
12. Thinking have serious illness	0.751	0.048	15.493	0.000
13. Distraction from bodily sensations	0.693	0.051	13.612	0.000
14. Family/friends	0.376	0.084	4.463	0.000
SHAI-NC BY				
15. Enjoy life with serious illness	0.591	0.081	7.297	0.000
16. Medical cure for serious illness	0.598	0.086	6.996	0.000
17. Life ruined by serious illness	0.851	0.065	13.048	0.000
18. Dignity lost by serious illness	0.484	0.078	6.178	0.000
NC WITH				
SHAI	0.582	0.066	8.835	0.000

Appendix C 4

Group 1 - ASI-3 descriptive statistics

Item	N	Skewness		Kurtosis	
			SE		SE
1. It is important for me not to appear nervous	206	.742	.169	-.495	.337
2. When I cannot keep my mind on a task, I worry that I might be going crazy	206	2.444	.169	6.042	.337
3. It scares me when my heart beats rapidly	205	1.026	.170	.469	.338
4. When my stomach is upset, I worry that I might be seriously ill	205	2.064	.170	4.358	.338
5. It scares me when I am unable to keep my mind on a task	205	1.524	.170	2.452	.338
6. When I tremble in the presence of others, I fear what people might think of me	204	2.141	.170	4.091	.339
7. When my chest feels tight, I get scared that I won't be able to breathe properly	206	1.541	.169	1.707	.337
8. When I feel pain in my chest, I worry that I'm going to have a heart attack	206	1.093	.169	.541	.337
9. I worry that other people will notice my anxiety	204	1.523	.170	1.731	.339
10. When I feel "spacey" or spaced out I worry that I may be mentally ill	204	2.812	.170	**8.832**	.339
11. It scares me when I blush in front of people	202	2.230	.171	4.338	.341
12. When I notice my heart skipping a beat, I worry that there is something seriously wrong with me	201	1.267	.172	.489	.341
13. When I begin to sweat in a social situation, I fear people will think negatively of me	201	2.257	.172	5.380	.341
14. When my thoughts seem to speed up, I worry that I might be going crazy	201	2.933	.172	**9.331**	.341
15. When my throat feels tight, I worry that I could choke to death	202	2.614	.171	6.985	.341
16. When I have trouble thinking clearly, I worry that there is something wrong with me	203	1.434	.171	1.540	.340
17. I think it would be horrible for me to faint in public	204	.763	.170	-.718	.339
18. When my mind goes blank, I worry there is something terribly wrong with me	203	1.399	.171	1.606	.340
Valid N (listwise)	200				

Appendix C 5

Group 1 - ASI-3 Standardised parameter estimates, 3-factor, WLSMV estimator

Two-Tailed	Estimate	S.E.	Est./S.E.	P-Value
SOCIAL BY				
ITEM1	0.526	0.057	9.273	0.000
ITEM6	0.877	0.038	23.073	0.000
ITEM9	0.830	0.032	25.932	0.000
ITEM11	0.857	0.045	18.942	0.000
ITEM13	0.858	0.039	21.807	0.000
ITEM17	0.673	0.045	15.007	0.000
PHYS BY				
ITEM3	0.687	0.044	15.627	0.000
ITEM4	0.694	0.053	13.124	0.000
ITEM7	0.786	0.036	21.848	0.000
ITEM8	0.772	0.037	20.867	0.000
ITEM12	0.843	0.035	23.853	0.000
ITEM15	0.847	0.047	17.871	0.000
COG BY				
ITEM2	0.699	0.051	13.660	0.000
ITEM5	0.733	0.042	17.253	0.000
ITEM10	0.806	0.051	15.678	0.000
ITEM14	0.860	0.037	23.128	0.000
ITEM16	0.903	0.030	30.326	0.000
ITEM18	0.874	0.030	29.255	0.000
PHYS WITH				
SOCIAL	0.874	0.029	29.918	0.00
COG WITH				
SOCIAL	0.817	0.032	25.877	0.00
PHYS	0.721	0.033	21.868	0.00

Appendix C 6

Group 1 - SSAS descriptive statistics

Item	N	Mean	SD	Skewness		Kurtosis	
					SE		SE
I can't stand smoke, smog or pollutants in the air	217	3.5438	1.4431	-.536	.165	-1.090	.329
I am often aware of various things happening within my body	215	2.6884	1.2038	.182	.166	-1.001	.330
When I bruise myself it stays noticeable for a long time	217	2.9677	1.4446	.113	.165	-1.335	.329
I can sometimes feel the blood flowing in my body	217	1.3825	.91098	2.690	.165	6.712	.329
Sudden loud noises really bother me	217	2.1889	1.2752	.898	.165	-.244	.329
I can sometimes hear my pulse or my heartbeat throbbing in my ear	217	2.1751	1.3529	.923	.165	-.367	.329
I hate to be too hot or too cold	217	3.1935	1.2943	-.133	.165	-1.088	.329
I am quick to sense hunger contractions in my stomach	217	2.2028	1.2749	.723	.165	-.640	.329
Even something really minor like an insect bite or splinter really bothers me	216	1.5694	.92751	1.948	.166	3.822	.330
I can't stand pain	217	2.1106	1.04382	.812	.165	.283	.329

Appendix C 7

Group 1 - BVS and BVS-H descriptive statistics

Item	N	Mean	SD	Skewness		Kurtosis	
					SE		SE
Item 1	218	4.5826	2.83414	-.116	.165	-.907	.328
Item 2	218	4.6055	2.85605	-.099	.165	-.933	.328
Item 3	218	1.1697	1.82244	2.042	.165	5.111	.328
Item 4	216	1.6107	1.68238	1.573	.166	2.585	.330
Item 5 (BVS-H only)	216	2.8897	1.93413	.770	.166	.330	.330
N (listwise)	216						

Appendix C 8

Group 1 BVS and BVS-H inter-item correlations

	item1	item 2	item3	item 4	item 5
item1	1.000	.910	.432	.432	.333
item 2		1.000	.467	.453	.351
item3			1.000	.461	.309
item 4				1.000	.668
item 5					1.000

APPENDIX D - SUPPLEMENTARY DESCRIPTIVE STATISTICS

Appendix D 1

Group 1 - Descriptive statistics for all variables, raw data

	N	Minimum	Maximum	Mean	SD	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Error	Statistic	Error
Age	221	65	97	79.43	6.379	-.215	.164	-.439	.326
Attitude to aging	179	0	5	3.08	1.579	-.434	.182	-.920	.361
Physical disability	219	0	100	60.93	26.937	-.437	.164	-.944	.327
Pain	218	.0	100.0	70.989	25.4247	-.669	.165	-.296	.328
General health	206	5.0	100.0	65.194	19.0432	-.430	.169	-.070	.337
Physical satisfaction	220	0	100	59.20	22.231	-.126	.164	.039	.327
Mobility	220	.0	100.0	95.214	12.8184	-4.227	.164	23.815	.327
Physical illness	219	0	12	3.67	2.313	.818	.164	.728	.327
Severity of illness	219	0	1099	301.33	199.434	.918	.164	1.163	.327
SSAS	219	1	44	23.90	6.918	.276	.164	.103	.327
BVS-H	214	.00	37.10	14.8408	8.62326	.310	.166	-.457	.331
BVS	214	.00	34.93	11.9610	7.61302	.289	.166	-.537	.331
ASI-3 total	204	0	52	10.67	10.131	1.456	.170	2.381	.339
ASI-3 physical	204	0	21	3.82	3.992	1.350	.170	1.971	.339
ASI-3 cognitive	204	0	17	2.83	3.511	1.487	.170	1.761	.339
ASI-3 social concerns	204	0	19	4.02	4.023	1.155	.170	1.015	.339
SHAI total	211	0	24	9.32	5.351	.569	.167	-.363	.333
SHAI-IL	212	0	21	7.20	4.460	.810	.167	.364	.333
SHAI NC	213	0	8	2.11	1.680	.563	.167	-.147	.332
DASS-21 Anx	214	0	30	3.49	4.839	2.308	.166	7.189	.331
DASS-21 Depr	214	0	42	4.33	6.152	2.735	.166	10.751	.331
DASS-21 Stress	214	0	38	5.71	6.358	1.642	.166	3.849	.331
Valid N (listwise)	156								

SSAS = Somatosensory Amplification Scale, BVS = Body Vigilance Scale, BVS-H = modified body vigilance scale, ASI-3 = Anxiety Sensitivity Index -3, SHAI = Short Health Anxiety Inventory, SHAI-IL = Short Health Anxiety Inventory Illness likelihood scale, SHAI-NC = Short Health Anxiety Inventory Negative Consequences scale, DASS-21 = Depression Anxiety and Stress Scale -21

Appendix D 2

Group 1 - Missing values analysis - psychological measures

	N	Mean	Std. Deviation	Missing		No. of Extremes[a]	
				Count	Percent	Low	High
attitude	179	3.08	1.579	42	**19.0**	0	0
SSAS	219	23.90	6.918	2	.9	1	2
BVS-H	214	14.8408	8.62326	7	3.2	0	0
BVS	214	11.9610	7.61302	7	3.2	0	0
ASI3	204	10.67	10.131	17	**7.7**	0	10
ASIphys	204	3.82	3.992	17	**7.7**	0	4
ASIcognitive	204	2.83	3.511	17	**7.7**	0	12
ASIsocial	204	4.02	4.023	17	**7.7**	0	6
SHAItot	211	9.32	5.351	10	4.5	0	0
SHAI-IL	212	7.20	4.460	9	4.1	0	5
SHAI-NC	213	2.11	1.680	8	3.6	0	5
DASSanx	214	3.49	4.839	7	3.2	0	22
DASSdep	214	4.33	6.152	7	3.2	0	13
DASSstress	214	5.71	6.358	7	3.2	0	8

a. Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

Appendix D 3

Group 1 - Gender cross tabulation

	Chi square	d*f*	*ρ*
Retirement village, yes/no	.054	1	.815
Living alone/with others	25.085	1	.000
Auckland /not Auckland	.086	1	.770
Sufficient income, yes/no	.926	1	.336
Tertiary/no tertiary	11.156	1	.001

Appendix D 4

Group 1 - Auckland/not Auckland cross tabulation

	χ^2	d*f*	*ρ*
Sufficient Income, yes/no	.233	1	.629
Tertiary/no tertiary	1.063	1	.303
Retirement village, yes/no	18.323	1	.000
Living alone/with others	1.677	1	.195

Appendix D 5

Group 1 - Illness frequencies

ILLNESS	SIRS-R	FREQUENCY
Asthma	85	18
Cancer	135	31
Diabetes	113	28
Epilepsy	98	5
High blood pressure or hypertension	95	100
Heart trouble (e.g., angina or myocardial infarction)	128/116	56
Irritable bowel syndrome	55	28
Bowel disorders (e.g., colitis or polyps)	55	34
Respiratory conditions (e.g. bronchitis, COPD or emphysema)	109	30
Chronic liver trouble (e.g., cirrhosis)	118	1
Stomach ulcers or duodenal ulcer	97	8
Hernia or rupture	59	25
Chronic kidney or urinary tract conditions	82/94	24
Chronic skin conditions (e.g., dermatitis, eczema or psoriasis)	63	22
Arthritis or rheumatism	89	94
Chronic fatigue syndrome		7
Sight impairment that cannot be corrected by glasses	80/78	35
Hearing impairment	104	80
Stroke	132	22
Osteoporosis	87	51
Depression or anxiety	100	24
Other mental health condition (e.g. schizophrenia or bipolar disorder)	112/126	0
joint replacement surgery		50

Appendix D 6

Group 1 correlations, all measures

	Attitude	Physical function	Sub health	Pain	Phys illness	SSAS	BVS	BVS-H	ASI-3 total	ASI-3 phys	ASI-3 cog	ASI-3 social	SHAI total	SHAI-IL	SHAI-NC	DASS-21 anx	DASS 21 dep	DASS -21 stress
Age	-.296**	-.308**	-.168*	.048	.236**	-.077	-.084		-.049	-.062	-.006	-.092	.068	.031	.148*	.028	.177**	.058
Attitude		.424**	.555**	.344**	-.354**	-.262**	-.201**	-.239**	-.232**	-.155*	-.238**	-.173**	-.325**	-.344**	-.182**	-.348**	-.388**	-.345**
Physical function		_	.509**	.509**	-.399**	-.282**	-.069	-.102	-.172*	-.150*	-.123	-.137*	-.292**	-.293**	-.157*	-.311**	-.314**	-.240**
Subjective health			_	.379**	-.407**	-.292**	-.251**	-.279**	-.169*	-.148*	-.147*	-.139*	-.426**	-.438**	-.234**	-.355**	-.323**	-.268**
Pain				_	-.398**	-.302**	-.245**	-.293**	-.145*	-.124	-.106	-.123	-.343**	-.383**	-.113	-.392**	-.295**	-.326**
Phys illness					_	.269**	.154*	.172*	.199**	.210**	.129	.131	.246**	.277**	.068	.304**	.242**	.239**
SSAS						_	.409**	.439**	.288**	.258**	.280**	.210**	.435**	.449**	.207**	.389**	.197**	.274**
BVS							_	.979**	.288**	.346**	.157*	.240**	.438**	.472**	.123	.311**	.221**	.267**
BVS-H								_	.314**	.350**	.197**	.249**	.453**	.494**	.127	.352**	.247**	.288**
ASI-3 total									_	.848**	.813**	.865**	.457**	.451**	.286**	.368**	.283**	.325**
ASI-3 phys										_	.542**	.654**	.385**	.378**	.229**	.318**	.213**	.198**
ASI -3 cog											_	.597**	.397**	.404**	.239**	.338**	.282**	.337**
ASI -3 social												_	.399**	.368**	.312**	.290**	.236**	.303**
SHAI total													_	.951**	.673**	.401**	.402**	.420**
SHAI-IL														_	.439**	.422**	.376**	.431**
SHAI-NC															_	.163*	.291**	.201**
DASS-21 anx																_	.483**	.552**
DASS 21 dep																	_	.649**

. Correlation is significant at the 0.05 level (2-tailed).*. Correlation is significant at the 0.01 level (2-tailed).

Appendix D 7

Group 2 - Raw data descriptive statistics

	N	Minimum	Maximum	Mean	*SD*	Skewness		Kurtosis	
							SE		SE
Pain	176	10.00	100.00	81.16	17.55	-1.429	.183	2.426	.364
Physical illness	177	0	6	1.07	1.209	1.450	.183	2.493	.363
SSAS	176	10	45	25.77	6.138	.039	.183	.185	.364
BVS	175	.00	34.80	17.696	7.602	-.137	.184	-.416	.365
ASI-3 physical	176	0	18	4.16	3.918	1.016	.183	.619	.364
ASI-3 cognitive	176	0	21	2.74	3.954	2.147	.183	5.372	.364
ASI-3 social	176	0	24	8.08	5.071	.663	.183	-.023	.364
SHAI total	174	2	30	12.02	5.395	.651	.184	.475	.366
SHAI-IL	176	0	23	9.28	4.819	.644	.183	.405	.364
SHAI NC	175	0	12	2.75	1.969	1.354	.184	3.534	.365
DASS-21 Anxiety	176	0	26	4.68	5.319	1.499	.183	2.002	.364
DASS-21 Dep	176	0	36	6.50	7.265	1.662	.183	2.552	.364
DASS-21 Stress	176	0	42	11.05	8.834	1.246	.183	1.533	.364

SSAS = Somatosensory Amplification Scale, BVS = Body Vigilance Scale, BVS-H = modified body vigilance scale, ASI-3 = Anxiety Sensitivity Index -3, SHAI = Short Health Anxiety Inventory, SHAI-IL = Short Health Anxiety Inventory Illness likelihood scale, SHAI-NC = Short Health Anxiety Inventory Negative Consequences scale, DASS-21 = Depression Anxiety and Stress Scale -21

Appendix D 8

Group 2 - Correlations between measures

		Age	Pain	Gen health	Phys ill	SSAS	BVS	ASI-3 phys	ASI-3 cog	ASI-3 soc	SHAI-IL	SHAI-NC	DASS -anx	DASS- dep	DASS-stre
Age	corr	1.000	-.064	.101	.108	-.059	.049	-.014	.039	-.078	.021	-.021	***-.185****	-.038	.146
	N	177	176	174	177	176	175	176	176	176	176	175	***176***	176	176
Pain	corr		1.000	**.284****	**.320****	***-.149****	***-.180****	-.066	**.213****	-.094	**.347****	-.043	-.145	-.137	**.240****
	N		176	174	176	176	174	175	175	175	175	174	175	175	175
General health	corr			1.000	**.337****	-.132	-.035	***-.180****	**.260****	-.102	**.348****	-.065	**.208****	**.252****	**.206****
	N				174	174	172	173	173	173	173	172	173	173	173
Physical illness	corr				1.000	.122	**.249****	.126	***.164****	**.262****	**.327****	-.047	***.169****	***.185****	**.313****
	N					176	175	176	176	176	176	175	176	176	176
SSAS	corr					1.000	**.426****	**.245****	***.171****	**.268****	**.379****	.001	**.252****	**.305****	**.243****
	N					176	174	175	175	175	175	174	175	175	175
BVS	corr						1.000	**.327****	.136	**.212****	**.548****	-.073	**.321****	.144	**.241****
	N						175	174	174	174	174	174	174	174	174
ASI-3 physical	corr							1.000	**.303****	**.425****	**.408****	-.028	**.343****	.079	**.205****
	N							176	176	176	175	175	176	176	176
ASI-3 cog	corr								1.000	**.510****	**.298****	.121	**.363****	**.364****	**.340****
	N								176	176	175	175	176	176	176
ASI-3 social	corr									1.000	**.374****	***.172****	**.378****	**.420****	**.398****
	N									176	175	175	176	176	176
SHAI-IL	corr										1.000	***.172****	**.335****	**.324****	**.382****
	N										176	174	175	175	175
SHAI NC	corr											1.000	**.260****	**.275****	**.240****
	N											175	175	175	175
DASS-21	corr												1.000	**.474****	**.532****
Anxiety	N											175	176	176	176
DASS-21 Dep	corr													1.000	**.525****
	N													176	176

Pairwise exclusion of data

. Correlation is significant at the 0.05 level (2-tailed).*. Correlation is significant at the 0.01 level (2-tailed).

Appendix D 9

Group 2 - illness frequencies

ILLNESS	SIRS-R	FREQUENCY
Asthma	85	50
Cancer	135	1
Diabetes	113	3
Epilepsy	98	0
High blood pressure or hypertension	95	3
Heart trouble (e.g., angina or myocardial infarction)	128/116	6
Irritable bowel syndrome	55	9
Bowel disorders (e.g., colitis or polyps)	55	2
Respiratory conditions (e.g. bronchitis, COPD or emphysema)	109	8
Chronic liver trouble (e.g., cirrhosis)	118	0
Stomach ulcers or duodenal ulcer	97	5
Hernia or rupture	59	7
Chronic kidney or urinary tract conditions	82/94	11
Chronic skin conditions (e.g., dermatitis, eczema or psoriasis)	63	22
Arthritis or rheumatism	89	4
Chronic fatigue syndrome		5
Sight impairment that cannot be corrected by glasses	80/78	2
Hearing impairment	104	2
Stroke	132	0
Osteoporosis	87	0
Depression or anxiety	100	21
Other mental health condition (e.g. schizophrenia or bipolar disorder)	112/126	2
Other condition		6

APPENDIX E – SUPPLEMENTARY INFORMATION

Appendix E 1

SHAI factor structure, comparison between studies

Study		Abramowitz et al., 2007			Kowalyk & Hadjistavropoulos, (2007)		
Item no	Factor / Content	1	2	NC	1	2	NC
1	Worry about health	√			*		
2	Noticing aches and pains		√			√	
3	Awareness of bodily sensations /changes		√			√	
4	Ability to resist thoughts of illness	√			√		
5	Fear of having a serious illness	√			√		
6	Picturing self being ill	√			√		
7	Ability to take mind off health thoughts	√				√	
8	Relieved if doctor says nothing wrong	√			√		
9	Hear about illness and think I have it	√			√		
10	Wonder what bodily sensations/changes mean		√			√	
11	Feeling at risk for developing illness	√			√		
12	Think I have serious illness	√			√		
13	Ability to think of other things if I notice unexplained body sensations		*			√	
14	Family/friend say I worry about my health	√				√	
15	Ability to enjoy life if I have a serious illness			√			√
16	Chance of medical cure if have a serious illness			√			√
17	Serious illness would ruin life			√			√
18	Loss of dignity if had a serious illness			√			√

√ = factor loaded, * = did not load

Appendix E 2

Suggested DASS cut-off scores

Description	Depression	Anxiety	Stress
Normal	0-9	0-7	0-14
Mild 8-9	10-13	8-9	15-18
Moderate	14-20	10-14	19-25
Severe	21-27	15-19	26-33
Extremely Severe	28+	20+	34

Source: Psychology Department, UNSW - www.psy.unsw.edu.au/dass

Appendix E 3

Comparison scores on psychological measures between current study and prior studies

	Present study Group 1	Present study Group 2	Boston & Merrick, 2010	Wheaton et al., 2012	Wheaton et al., 2010	Geromilatos & Edelstein, 2012 Old/young	Barsky et al., 1991 Old/young	Olatunji et al.,
SHAI total	9.32	12.02	9.62		12.48	11.23 /14.68		
SHAI-IL	7.20	9.28	7.04			9.1 / 11.59		
SHAI NC	2.11	2.71	2.40			2.1 / 3.06		
ASI-3 soc	4.02	8.08		7.56	7.86			
ASI-3 phys	3.8	4.16		3.63	3.92			
ASI-3 cog	2.81	2.66		2.72	2.91			
BVS	11.96	17.70			13.85			15.52
SSAS	23.90	25.77					1.94 /2.02	