Mental health and chronic pain conditions in a nationally-representative sample of South African adults

A cross-sectional study

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ABSTRACT

BACKGROUND

Chronic pain is considered a significant burden at both a personal and social level. Not only does it lead to individual suffering and loss of work or social roles, but it also places a great demand on health care systems. Chronic pain has been shown to be associated with both depression and anxiety disorders, adding to the drain on society. Most of the existing research on chronic pain and its association with mental disorders has focused on Europe and North America, with little research from developing countries. There are few data on the prevalence of chronic pain at a population level in South Africa, and no research into the association between chronic pain and mental health. This study assessed the population prevalence and demographic characteristics of people with chronic pain conditions in South Africa, focusing on arthritis/rheumatism and chronic back/neck pain, the two most common forms of chronic pain. The thesis examined the associations between these chronic pain conditions and common mental disorders in South Africa, with particular attention to possible gender differences in this association.

METHODS

The data for this study come from the South African Stress and Health Survey which was part of the World Health Organisation (WHO) World Mental Health survey initiative. The study population was a nationally-representative probability sample of 4 351 adults. The WHO Composite International Diagnostic Interview version 3 was used to assess mental disorders prevalent in the preceding 12 months based on the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition. Disorders in this analysis are depression, anxiety and alcohol related disorders. Arthritis/rheumatism and chronic back/neck pain were self-reported based on whether or not participants had experienced either of these two chronic pain conditions in the preceding 12 months. Information was also collected on self-reported professionally diagnosed medical conditions, other chronic pain as well as demographic and socioeconomic variables and traumatic life events.

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RESULTS

In the study sample, the prevalence of arthritis/rheumatism was 10% and the prevalence of chronic back/neck pain was 26%. With regard to mental disorders the 12-month prevalence of major depressive disorder was 5 %, of anxiety disorders was 8%, and of alcohol-related disorders was 5%. An association between the above mentioned chronic pain conditions and both anxiety disorders and major depressive disorder was found after adjustment for sociodemographic characteristics, other chronic pain, other medical conditions and traumatic life events. The strongest associations were between arthritis/rheumatism and social phobia (odds ratio: 2.29; 95% confidence interval: 1.04 - 5.04), between chronic back/neck pain and post traumatic stress disorder (odds ratio: 3.22; 95% confidence interval: 1.18 - 8.76), and between chronic back/neck pain and major depressive disorder (odds ratio: 1.61; 95% confidence interval: 1.09 - 1.68). In all cases, women had a higher prevalence of chronic pain, chronic medical conditions and DSM-IV common mental disorders. After adjustment, women with arthritis/rheumatism had a 2.55 times increased odds of social phobia (95% confidence interval: 1.12 - 5.79) and women with chronic back/neck pain had a 2.06 times increased odds of generalised anxiety disorder (95% confidence interval: 1.20 - 3.56) and a 1.64 times increased odds of major depressive disorder (95% confidence interval: 1.04 - 2.60). There were no statistically significant associations between men with arthritis/rheumatism and mental disorders, but men with chronic back/neck pain had a 4.61 times increased odds of post traumatic stress disorder (95% confidence interval: 1.02 - 20.80) and a 2.79 times increased odds of panic disorder (95% confidence interval: 1.09 - 7.13). In assessing sex as a putative effect modifier, the results indicated that women generally had a stronger association between chronic pain conditions and mental disorders, with two exceptions: men had stronger associations between chronic back/neck pain and post traumatic stress disorder and between chronic back/neck pain and panic disorder.

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CONCLUSION

These data suggest that the prevalence of chronic pain conditions in the South African population is comparable with that of developed countries. Furthermore, these chronic pain conditions are significantly associated with common mental disorders. In the case of the association between chronic back/neck pain and mental health, our results are similar to international findings. However, the associations between arthritis/rheumatism and mental health in South Africa differ from those of other countries in two ways: our data showed a

weak and imprecise association with major depressive disorder, where others had a significant association; and the individual anxiety disorder most strongly associated with arthritis/rheumatism in our study was social phobia, where others found that arthritis is most strongly associated with generalised anxiety disorder and post-traumatic stress disorder. In considering gender, our study found that, while women are known to have more mental disorders, men also show a significant association between chronic back/neck pain and mental disorders that should not be overlooked. These findings suggest that the link between chronic pain conditions and mental health requires attention in health services and interventions. This attention may be focused at two levels: in treating acute physical pain in a manner appropriate to minimise chronicity and potential mental health sequelae; and in recognising and treating mental disorders in men and women with chronic pain conditions. Treatment for chronic pain should be underpinned by evidence-based practices such as interdisciplinary pain management programmes that incorporate mental health practitioners and cognitive behavioural therapy.

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ABBREVIATIONS

CI	95% Confidence Intervals
CIDI	Composite International Diagnostic Interview
CBT	Cognitive Behavioural Therapy
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders, 4th edition
EA	Enumeration Area
GAD	Generalised Anxiety Disorder
IASP	International Association for the Study of Pain
MDD	Major Depressive Disorder
OA	Osteoarthritis
OR	Odds Ratio
PSUs	Primary Sampling Units
PTSD	Post-traumatic stress disorder
RA	Rheumatoid Arthritis
SADHS	South African Demographic and Health Survey
SASH	South African Stress and Health Study
SES	Socioeconomic Status
WHO	World Health Organisation
WMH	World Mental Health (Survey)

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I. INTRODUCTION

Chronic pain is recognised as a common problem in all societies, affecting both physical and psychological health, as well as social and economic wellbeing (Elliott et al. 1999). It is considered to be one of the primary reasons that people approach health care systems (Elliott et al. 1999; Gatchel 2004; Main & de C Williams 2002). Chronic pain is defined as pain that lasts longer than 3 months, the time required for normal tissue healing (IASP 1986). The most common forms of chronic pain are back and neck pain, and arthritis (Elliott et al. 1999), which shall be the focus of this study.

Studies have shown that both chronic back and neck problems and arthritis have considerable prevalence in developed countries. The 12-month prevalence for chronic back and neck pain in adults has been estimated to range between 15% and 56% in Europe and the United States (Demyttenaere et al. 2007). While less data exists for the prevalence of arthritis, results from an American survey estimate the prevalence to be 16% (Lundkvist et al. 2008). The costs involved in health care interventions, compensation and work loss for both these chronic pain conditions are sizable: R7.1 billion* to the National Health Service and R20.72 billion* to social security costs for back pain in the United Kingdom in 1994 (Smith et. al. 2004); and R522 billion# in Europe and R487.2 billion# in the United States for health care costs associated with arthritis (Lundkvist et al. 2008).

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Equivalent data on chronic pain conditions are rare in Africa. To date there has been no national population survey on chronic back and neck pain in South Africa, although some clinical and occupational data exists. The only African population-based survey on chronic spinal pain indicates a 12-month prevalence of 16.4% (95% confidence interval, 14.5% - 18.5%) in Nigeria (Gureje et al. 2007). Historical information on arthritis suggests a conspicuously low prevalence of arthritic conditions in Africa, but more recent research indicates otherwise (McGill & Njobvu 2001). Urban areas, in particular, appear to be

* Rand equivalent of British Pound using an exchange rate of R14.80 to the Pound.

Rand equivalent for Euro using an exchange rate of R11.60 to the Euro.

experiencing an increasing prevalence (McGill & Njobvu 2001). The most recent Demographic and Health Survey (SADHS 2003) from the South African Department of Health, the first of its kind to assess the population prevalence of arthritis, found that the condition is more common in women, with an estimated point-prevalence of 8%.

The literature from developed countries convincingly demonstrates that chronic pain conditions like arthritis and back or neck pain are associated with common mental disorders (depression, anxiety disorders and substance use disorders) (Demyttenaere et al. 2007; Von Korff et al. 2005). Furthermore, it is understood that this comorbidity leads to sustained morbidity in both the chronic pain conditions and mental disorders, and results in increased disability (Currie et al. 2004).

Mental disorders themselves contribute to significant morbidity in the developed world. The 2000 Global Burden of Disease Study found that depression is responsible for the largest non-fatal burden worldwide (Stein et al. 2004). Research on anxiety disorders and substance abuse shows that these are also highly prevalent (Demyttenaere et al. 2004). Mental disorders are known to have greater effects on role functioning than many serious chronic physical illnesses (WHO World Mental Health Survey Consortium, 2004). The World Mental Health Survey conducted from 2001 to 2003 noted substantial under-treatment, and possible under-recognition, of severe mental health cases in most countries: Between 35% and 50% of severe cases in developed countries, and 76% to 85% in developing countries, received no treatment in the 12 months prior to the survey. This is particularly noteworthy given that in cases of comorbidity with pain conditions, mental disorders are often missed or presented as somatic conditions (Bair et al. 2003), which further prevents appropriate treatment.

The prevalence of 12-month mental disorders has been published recently in South Africa (Williams et al. 2008). The results from this national population-based survey indicate that South Africa has strikingly higher prevalence of mental disorders compared with Nigeria, the only other African country to have comparable data (the 12-month prevalence of any mental disorder was 17% in South Africa and 6% in Nigeria) (Gureje et al. 2006; Williams et al. 2008). Furthermore, South Africa has a higher prevalence of common mental disorders than a number of other countries involved in the World Mental Health Surveys (Williams et al.

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2008). Any anxiety disorder (12-month prevalence of 18%) followed by any substance use disorder (12-month prevalence of 6%) were the most prevalent group of mental disorders, with major depressive disorder, agoraphobia and alcohol abuse being the most common individual disorders using the DSM-IV classification (Williams et al. 2008). The study also showed that in many instances more than one mental disorder coexisted. Women were more likely to report anxiety and mood disorders while men were more likely to report substance abuse; this is in keeping with international trends (American Psychiatric Association 1994).

It is striking that there is so little knowledge of chronic pain in African countries, for four reasons: pain is a significant burden to health resources; it has been shown to cause considerable suffering to patients in the developed world; it is a common feature of many communicable and non-communicable diseases, both of which are increasing in South Africa (Bradshaw et al 2000); and the only data we have on musculoskeletal injuries suggests that back pain and arthritis warrant further attention (SADHS 1998). As long as we do not know the social and economic burden of chronic back and neck pain or arthritic conditions, we cannot intervene appropriately. Furthermore we lack data on the association between chronic pain conditions and mental health. The suggested association between chronic spinal pain and substance use disorder in Nigeria warrants further attention before it can be assumed that the situation is similar in other African countries. Lastly, in light of the South African constitution which seeks gender equality it is equally important that we determine whether women bear a greater burden of chronic pain and whether their mental disorders are masked by this.

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This study, therefore, aims to describe the association between chronic pain conditions and mental health in a nationally-representative sample of South African adults. The specific objectives are:

1. To describe the prevalence of:
    a) arthritis/rheumatism and
    b) chronic back/neck pain in the study sample;

2. To investigate the association between each of the above chronic pain conditions (arthritis/rheumatism and chronic back/neck pain) and specific 12-month DSM-IV defined mental disorders, namely:

   a) Anxiety disorders: post-traumatic stress disorder, panic disorder without agoraphobia, social phobia, agoraphobia without panic, and generalised anxiety disorder;

   b) Major depressive disorder;

   c) Alcohol-related disorders including alcohol abuse and dependence; and,

3. To assess whether the associations between the specific 12-month mental disorders stated above and the chronic pain conditions (arthritis/rheumatism and chronic back/neck pain) are modified by the sex of the participant.

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II. LITERATURE REVIEW

The link between mental and physical components of persons has been recognised since ancient times. In the 4th century BCE, Plato claimed that both body and soul needed to be treated in order to make the whole person cured (Waddell 2004). Although this holistic notion persisted for some time, it was largely discarded with the advent of modern medicine, at the turn of the 20th century, which was characterised by biomedical reductionism and a "dualistic" approach (Gatchel 2004; Waddell 2004). The results of the biomedical approach were a tendency to distinctly separate diseases of the body and diseases of the mind, and to distinguish "real" disease from "imaginary" illness (Kirmayer 1999). The impact of this on patients with chronic pain was that, where a specific physical basis could not be identified, the pain was termed "psychogenic", meaning that it had a psychological origin and therefore was not "real" (Craig 2006; Gatchel 2004; Vlaeyen et al. 2007). The medical paradigm not validating their pain had an extremely negative effect on patients with chronic pain, who were instead labelled with diagnoses of hysteria, hypochondriasis and more recently somatisation or somatoform disorders and fibromyalgia (Lipowski et al. 1977; Waddell 2004; Yutaka et al. 1999). Fortunately, the understanding of the interaction between chronic pain and mental health has improved, and "psychogenic pain" is no longer a valid diagnosis in the DSM-IV (Gatchel 2004). Chronic pain is now understood to be the result of a complex interweaving of biological, psychological and social factors (Gatchel 2004; Vlaeyen et al. 2007; Waddell 2004).

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II.1 CHRONIC PAIN

Pain has been defined by the International Association for the Study of Pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage" (Subcommittee on Taxonomy 1986). Thus, pain has by definition an emotional/interpretive component as well as a physical/sensory/experiential component. Pain is a subjective experience which is interpreted by higher mental processes (Crombie et al. 1999). Consequently, at both the level of perception and the level of interpretation, distortions can be made which will alter the way pain is understood. In this way, meaning is given to the sensation, resulting in a complex psychological and behavioural response (Dworkin 1994). The experience of pain is

underpinned by the interaction of psychosocial, behavioural and pathophysiological processes (Rudy et al. 1990), making pain "a complex set of phenomena rather than a simple, specific or discrete entity" (Gatchel 2004: 796). This complexity renders the study of the epidemiology of pain fraught with difficulties (Crombie & Davies 1999).

Chronic pain is an ill-defined term, but it is generally considered to be pain lasting from 3 months (Elliott et al. 1999) to 6 months (Currie & Wang 2004) or longer. Chronic pain presents itself in many parts of the body, but the most common forms of chronic pain are back and neck pain, and arthritis (Demyttenaere et al. 2007; Elliott et al. 1999). Both of these terms are somewhat vague: chronic back and neck pain loosely refers to pain from these sites in the body; arthritis generally describes rheumatoid arthritis and osteoarthritis, both of which are associated with musculoskeletal pain as the foremost symptom (Minnock et al. 2003; Sangha 2000). Other common chronic pain conditions are angina, headaches, limb pains, chest pain, gastrointestinal pain and temperomandibular joint pain (Dworkin 1994; Elliott et al. 1999; Ohayon & Schatzberg 2003).

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II.1.1 Chronic back and neck pain

Chronic pain is recognised as a symptom which places a considerable burden on society (Blair et al. 2004; Gureje et al. 2007; Lee et al. 2007; Von Korff et al. 2005), with forty-six percent of the general population affected (Elliott et al.1999). Back and neck pain are considered one of the most common forms of chronic pain in developed countries (Blair et al. 2004). Until recently, most research on musculoskeletal pain conditions was clinic-based and not representative of populations, but a number of new studies have indicated population prevalence. Due to the methodologies involved in population-based studies, which are generally cross-sectional in nature, much of the data collected is self-reported, which minimises the opportunities to have specific clinical diagnoses of pain related conditions. Chronic back pain prevalence of between 14% and 16% has been reported in the UK (Blair et al. 2004); 16% chronic spinal pain in Nigeria (Gureje et al. 2007) and 19% chronic spinal pain in the USA (Von Korff et al. 2005). McWilliams et al. (2004) report 19% prevalence of arthritis and 20% prevalence of back pain in the USA. A recent international study comparing 17 different countries in Europe, the Americas, the Middle East, Africa, Asia and the South Pacific found that chronic back or neck pain prevalence ranged from 9.7% to 42% (Demyttenaere et al. 2007). It is worth noting that although some of the differentiation in

pain prevalence in different countries has been attributed to case definition (Crombie & Davies 1999), in this latter study, all countries used a standardised questionnaire. The study concluded that chronic back or neck pain was a common condition across a mix of races, cultures and socioeconomic statuses, although the prevalence varied in different nations, for reasons as yet unknown (Demyttenaere et al. 2007). Chronic back and neck pain has a higher prevalence among women and the less educated, and increases with age (Gureje et al. 2007; McWilliams et al. 2004; Von Korff et al. 2005).

II.1.2 Arthritis and Rheumatism

Rheumatic diseases are equally burdensome for society. The term "rheumatic disease" is also poorly defined, and is known to include more than one hundred conditions, the most common of these being rheumatoid arthritis and osteoarthritis (Sangha 2000). Rheumatoid arthritis (RA) is a chronic, multisystemic, autoimmune disease with unknown aetiology, while osteoarthritis is a degenerative joint disease which affects joint cartilage and the underlying bone (Sangha 2000). Both are difficult to diagnose and subsequently are prone to measurement error. RA is known to occur all over the world, and has a point prevalence of between 0.5% and 1% (Lundkvist et al. 2008; Sangha 2000). Although variation in prevalence estimates occurs, some of this is considered to be the result of differing definitions and methodologies (Lundkvist et al. 2008; Sangha 2000). In spite of the fact that RA has been shown to occur in all race groups, it has historically been thought to be less prevalent among rural sub-Saharan Blacks (Sangha 2000), although new evidence is refuting these claims (McGill & Njobvu 2001). The prevalence of RA is higher in females and those of lower socioeconomic status (Brekke et al. 1999), and increases with age (Sangha 2000). Osteoarthritis (OA) varies considerably in prevalence depending on the joints which are affected, the most common being hips and knees. Despite the variation, age is clearly the biggest predictor of OA (Sangha 2000). Like RA, OA is more prevalent in women (Sangha 2000). Arthritis is one of the most prevalent chronic diseases in The People's Republic of China, with a point prevalence for osteoarthritic knees of 6% to 12% (depending on sex and region), and for RA of 8% to 10% (Lee et al. 2007).

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II.2 MENTAL HEALTH

Mental health has many different definitions depending on culture and interpretation. It encompasses subjective wellbeing, self-efficacy, autonomy, and competence, as well as self-actualisation of intellectual and emotional potential (WHO 2001). Although it is impossible to find a comprehensive cross-cultural definition for mental health, it is agreed that it is broader than the absence of mental disorders (WHO 2001). The WHO currently uses the following as a working definition of mental health: "a state of emotional and social wellbeing in which the individual realises his or her own abilities, can cope with the normal stresses of life, can work productively or fruitfully, and is able to make a contribution to his or her community" (WHO 2001: 5). The DSM-IV goes to lengths to explain that the very classification of mental disorders implies a separation between mental and physical disorders based on a "dualistic" distinction that is not in fact true (American Psychiatric Association 1994). However, it goes on, in the absence of a better term, to conceptualise a mental disorder "as a clinically significant behavioural or psychological syndrome or pattern that occurs in an individual and that is associated with present distress or disability or with a significantly increased risk of suffering, death, pain, disability, or an important loss of freedom" (American Psychiatric Association 1994: xxi). It is important to note that a mental disorder is not just a variation of normal; nor is all distress a mental disorder. A mental disorder is abnormal or pathological, sustained or recurrent, and results in personal distress or impaired function (WHO 2001). Mental disorders are best conceptualised within a biopsychosocial framework, which recognises that biological, psychological and social factors each play an important role in the aetiology of mental states (WHO 2001).

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Mental disorders have become easier to study from an epidemiological perspective. Recent years have brought structured interviews, uniform definitions and standardised diagnostic criteria, which allow for reliable and valid diagnoses, and comparable data (WHO 2001). This has been further enhanced by the advent of international diagnostic standards like the World Health Organisation (WHO) Composite International Diagnostic Interview (CIDI). Research from using the WHO CIDI in an international survey revealed that the prevalence of mental disorders was generally greater than that of any other class of chronic conditions (WHO WMH Survey Consortium 2004). Furthermore, it was found that the disability produced from these mental disorders was more substantial than in many other serious chronic physical illnesses (WHO WMH Survey Consortium 2004). It should be noted that the authors cautioned that this prevalence data did not differentiate between severe and mild

conditions, and after further investigation suggested that approximately half of the above mentioned mental disorders were mild (WHO WMH Survey Consortium 2004). Nonetheless, mental disorders do contribute significantly to morbidity in the world population, and are considered to be on the increase (Ustun 1999).

Depression and anxiety disorders make up the majority of common mental disorders. Depression may be a temporary mood state, a reaction to concurrent losses or stresses, or a chronic state of "dysthmia" or "major depression" (Rush et al. 2000). Major depressive disorder (MDD) is characterised by at least 2 weeks of either loss of interest and pleasure in everyday life or a sustained and pervasive sad mood (Rush et al. 2000) (see Appendix 1 for DSM-IV diagnostic criteria). Although depression is generally considered the single most disabling mental disorder (Ustun 1999), the results from the World Mental Health (WMH) Survey show anxiety disorders to be most prevalent worldwide, followed by mood disorders (including depression) (WHO WMH Survey Consortium 2004). Anxiety is the response to an unknown threat that is vague, internal and conflictual (Sadock & Sadock 2003: 591), and an anxiety disorder can be understood as "an incapacitating fear based on mistaken beliefs" (Main & Booker 2000: 27). Twelve anxiety disorders are defined in the DSM-IV, including panic disorder without agoraphobia, agoraphobia without panic, generalised anxiety disorder, social phobia and post-traumatic stress disorder (see Appendices 2 to 6 for DSM-IV diagnoses). Anxiety disorders are known to be more common among women than men, and less common among those of higher socioeconomic status. Depression is also more common among women and those living without a partner, but there appears to be no association between depression and socioeconomic status (Sadock & Sadock 2003). Lastly, the World Mental Health Survey (2004) found substance disorders, including alcohol-related disorders, to be least prevalent. Despite their lesser prevalence, however, alcohol-related disorders constitute a significant health problem due to strong associations with risk taking behaviours, resulting in morbidity, domestic violence, motor-vehicle accident fatalities and reduced productivity to name but a few negative consequences (Sadock & Sadock 2003). Alcohol-related disorders are more prevalent among men, Whites and those of higher education, although no socioeconomic levels are exempt (Sadock & Sadock 2003).

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II.3 ASSOCIATION BETWEEN CHRONIC PAIN AND MENTAL HEALTH

Although it is unsurprising that chronic pain causes a degree of emotional distress, it is important that its association with diagnosable mental disorders is recognised. In the developed world, the association between mental health and chronic pain conditions (especially chronic back or neck pain and arthritis) has been the subject of research studies for some time (Benjamin et al. 2000; Currie & Wang 2004; Demyttenaere et al. 2007; Gureje et al. 2007; Krishnan et al. 1985; Lee et al. 2007; McWilliams et al. 2003, McWilliams et al. 2004). While the general population burden of major depressive disorder (MDD) in North America and Europe is estimated to be between 2% and 6%; the prevalence of MDD and anxiety disorders in those with chronic pain is considerably higher and is reported to be between 20% and 40% (Currie & Wang 2004; McWilliams et al. 2004; Von Korff et al. 2005). This is especially concerning in light of the fact that the association between mental disorders and chronic pain has been shown to prolong the state of ill-health as well as to cause greater disability (Bair et al. 2003).

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It is important to consider some of the epidemiological pitfalls in studying the association between chronic pain and mental health. Although a case definition for mental disorders has been achieved, an equivalent definition for chronic pain remains elusive (Von Korff 1999). Prior to the development of an internationally-recognised tool for assessing mental disorders, many different measurement instruments were used, reducing the comparability of studies (Bair et al. 2003; Dickens et al. 2002). Most of the earlier research studies on the association between chronic pain and mental disorders were taken from clinical samples, and few were adjusted for potential confounders, leading to higher estimates of the association than was actually present in the population (Demyttenaere et al. 2007). Fortunately, much of the recent research has overcome these limitations by conducting cross-sectional population-based studies using standardised instrumentation.

II.3.1 Research supporting the association

The most commonly researched mental disorder shown to be associated with chronic pain is depression, , specifically (since the streamlining of diagnostic instruments) major depressive disorder. For some time, it has been known that depression is associated with chronic pain

conditions ranging from headaches and back pain to fibromyalgia and arthritis (Bair et al. 2003; Dickens et al. 2002; Krishnan et al.1985).

Depression was considered the predominant mental disorder associated with chronic pain conditions until research began on the association between anxiety disorders and chronic pain (Demyttenaere et al. 2007). In a study challenging this hypothesis, depression was in fact found to be the most prevalent mental disorder in those with chronic back pain; however the association between chronic back pain and past-year specific anxiety disorders (panic disorder and post-traumatic stress disorder) was found to be stronger than that of past-year depression and chronic back pain (odds ratios for past-year panic disorder and post-traumatic stress disorder (PTSD) were 2.7 and 2.5 respectively, whereas past-year depression had an odds ratio of 2.0) (McWilliams et al. 2003).

These findings were confirmed in the most recent multinational study assessing the association between back and neck pain and mental disorders, which included 17 countries (Demyttenaere et al. 2007). In addition to the high prevalence of depression in those with chronic back and neck pain and the stronger association with individual anxiety disorders (particularly PTSD and generalised anxiety disorder), an association between substance use disorder and chronic back and neck pain was also found (OR = 1.6; 95% CI: 1.4 - 1.9). Of note is that when anxiety disorders are pooled together, the strength of association between anxiety disorders with chronic back and neck pain is slightly weaker (OR = 2.1; 95% CI: 2.1 - 2.4) than the association of mood disorders (including MDD) and back and neck pain (OR = 2.3; 95% CI: 2.1 - 2.5). These results indicate why the association between chronic pain and depression was considered the foremost association for some time.

Interestingly, studies of arthritis and mental disorders have shown a stronger association with anxiety disorders than with depression (Lee et al. 2007; McWilliams et al. 2004; Patten et al. 2006). Furthermore, Patten et al. (2006) noted that fibromyalgia and back pain are more strongly associated with mood, anxiety and substance use disorders than arthritis is.

Overall it is undisputed that a positive association exists between depression and anxiety disorders and chronic pain (Demyttenaere et al. 2007; Lee et al. 2007; McWilliams et al. 2004; Von Korff et al. 2005). This has been demonstrated in a few highly comparable cross-

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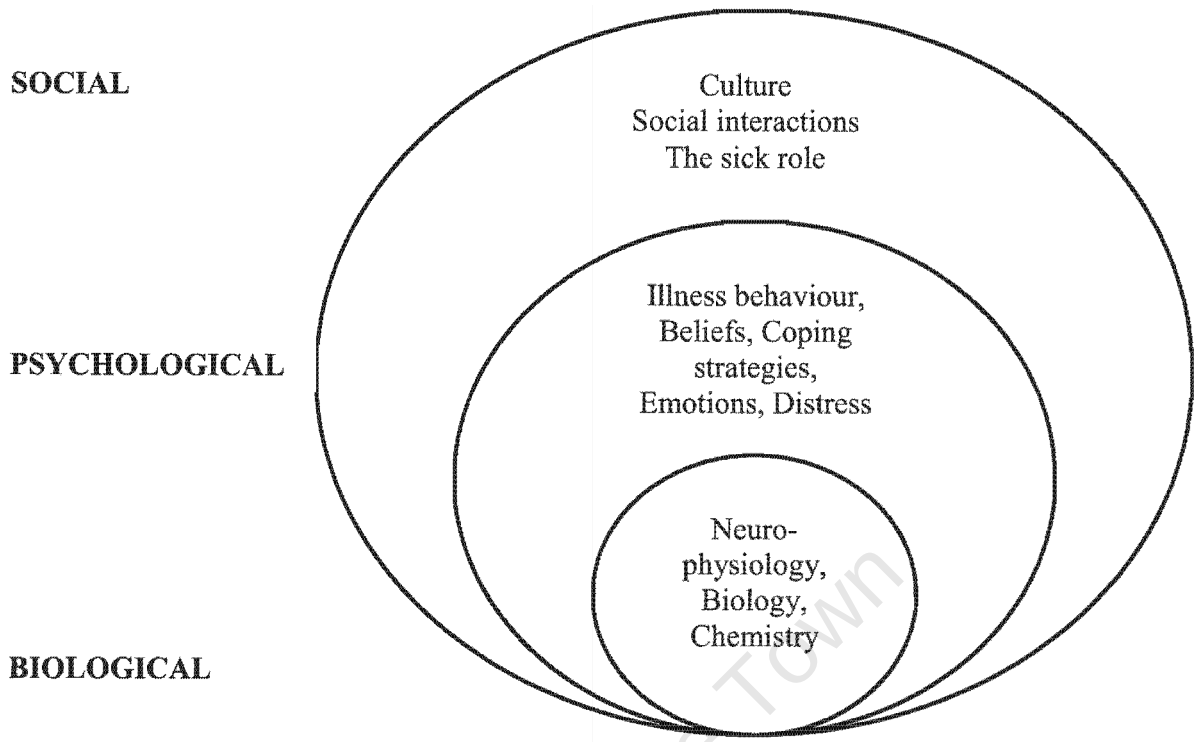
sectional studies in recent years, all using similar methods, particularly with regard to the instrument (WHO CIDI) used to define chronic pain conditions and mental disorders. In a population study in the United States, Von Korff et al. (2005) concluded that those with chronic spinal pain were 2.3 times more likely to have a mental disorder than those without chronic spinal pain; and that those with mental disorders (anxiety, mood or substance use disorders) were twice as likely to have chronic spinal pain than those without mental disorders. Gureje et al. (2007) in a population study in Nigeria also found the likelihood of having a mental disorder in those with chronic spinal pain to be twice that of those without chronic spinal pain, although the strongest association in their study was between spinal pain and substance use disorder. Despite some variation between countries, the results from the WMH survey indicate that across a diverse group of cultures and nationalities, and after adjustment for sex and age, common mental disorders (mood, anxiety and substance use disorders) are associated with chronic pain conditions (Demyttenaere et al. 2007).

II.3.2 Interpreting the association

While it is relatively straightforward to identify the association between chronic pain and mental disorders, disentangling psychological factors from the aetiology of pain is more complicated (Crombie & Davies 1999). In order to understand the interplay of factors in the experience of chronic pain, it is helpful to view chronic pain within a causal framework. In epidemiological terms, this consists of the agent, the host and the environment in a multidimensional triad (Crombie & Davies 1999). Using this framework, it is easier to conceptualise the expression of chronic pain as a complex inter-play of the causative mechanisms (agent) including physical and chemical/biological processes; the individual (host) with their specific genetic make up and psychology; and the social and physical context (environment), including cultural and societal factors extending from the family to the global economy (Crombie & Davies 1999). This understanding is expressed in the biopsychosocial construct of chronic pain (Figure 1).

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Figure 1: A biopsychosocial model of chronic pain



Adapted from Waddel 2004: 272

While the biopsychosocial model is not a representation of the causal mechanisms for pain, it helps us to consider some of the reasons why only some people develop chronic pain and become disabled, thus indicating appropriate entry points for intervention (Waddell 2004). This model suggests that the biological/physical impairment is interpreted at a psychological level which in turn leads to behavioural changes that are reinforced or shaped by an individual's social circumstance. The model represents illness (the subjective experience of disease) as distinct from disease (the biological event) (Gatchel 2004).

One of the key difficulties in determining the aetiology of the association between chronic pain and mental health is that most research investigating the association has been cross-sectional, thereby mitigating the possibility of deriving causal inference. Cross-sectional study designs only report on prevalence, and therefore it is not possible to determine the temporal relationship between chronic pain conditions and mental health. Although some prospective studies have been performed, there is still variability in the results; however three key theories exist in the literature.

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II.3.3 Theoretical approaches to the causal mechanism

Because most of the research on the causal mechanisms between mental disorders and chronic pain has focused on depression (Gureje et al. 2008; Von Korff et al. 2005), most of the theoretical approaches are based on the association between depression and chronic pain.

a) Chronic pain as a form of masked depression

The first approach explores the hypothesis that chronic pain is a type of masked depression (Nicholas 2007; Von Korff et al. 1996). This claim could be explained by the fact that chronic pain and depression have similar biological pathways (Bair et al. 2003; Gatchel 2004). Nociceptive (nerves stimulated to carry messages about tissue damage to the brain) and affective pathways coincide anatomically (Fishbain 1997; Gatchel 2004). Additionally, the two neurotransmitters most implicated in the pathophysiology of mood disorders, norepinephrine and serotonin, are also involved in the process of pain (Fishbain 1997; Gatchel 2004). Theories based on these biological pathways suggest that in a depressed state, the normal modulation of minor incoming signals from the body to allow focus on more important external events is prevented (Bair et al. 2003). This results in an amplification of these minor signals, and as a result more attention and emotion is focused on them (Bair et al. 2003). This may explain why patients who have depression tend to describe numerous pain symptoms, and why their pain is regularly associated with increased focus, attention and negative affect (Bair et al. 2003).

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This theory of common biological pathways has raised concerns regarding diagnosing depression in chronic pain patients (Fishbain et al. 1997; Wilson et al. 2001). An overlap in biological pathways means that many of the symptoms occurring in both chronic pain and in depression are similar, some of which are included in contemporary diagnostic criteria for major depressive disorder (Fishbain et al. 1997; Wilson et al. 2001). Although this concern is valid, it has been found that, in spite of the fact that those with chronic musculoskeletal pain experience considerable symptom overlap (particularly insomnia, fatigue and difficulty concentrating), these symptoms occurred at much higher rates among those with MDD than those without (Wilson et al. 2001). It therefore stands to reason that it is better to have a few false positive diagnoses than to miss MDD in patients with chronic pain (Wilson et al. 2001). This notwithstanding, it is still unclear as to why some people with chronic pain are depressed while others are not, and vice versa (Nicholas 2007). Furthermore, the hypothesis

of chronic pain as masked depression is inconsistent with the fact that chronic pain has a comparable association with anxiety disorders (Gureje et al. 2008).

b) Mental disorders antecedent or consequent to chronic pain

The second theoretical approach to the causal link between chronic pain and mental disorders revolves around whether mental disorders are antecedent, or consequent, to chronic pain (Fishbain et al.1997; Polatin et al.1993; Rush et al. 2000). In a cross-sectional study assessing lifetime and current DSM-III diagnosed psychiatric disorders among patients with chronic back pain, substance abuse disorder had a generally premorbid pattern to chronic pain, while depression was almost equally divided between being antecedent and consequent to chronic pain (Polatin et al. 1993). However, these results represent prevalent, not incident, cases of mental disorders; though the authors aimed to determine incident cases of adult back pain relative to life-time mental disorders which arose at adolescence, patient recall bias and evaluator bias cannot be excluded from these results.

A later study reviewing the literature on the association between depression and chronic pain reported that only a few of the studies which favoured mental disorders as antecedent to chronic pain were able to find the evidence to support their hypothesis, while more than 15 research studies supported the theory of consequent development of mental disorders (Fishbain et al. 1997). The authors noted however that the diagnostic tools for evaluating depression varied throughout the studies, and many made use of diagnostic instruments which are known now to have substantial problems.

The consequent hypothesis is further supported by those arguing that chronic pain is a potent psychological and physical stressor that could influence mood, thus acting as a trigger for depression (Ohayon & Schatzberg 2003), as well as the fact that pain causing interference with role performance is a greater predictor of depression than pain intensity (Von Korff & Simon 1996). The results from a more recent literature review suggest that, while the consequent hypothesis has more substance, the antecedent hypothesis cannot be ruled out, with the authors concluding that chronic pain may exist in part because depression is a risk factor for chronicity (Rush et al. 2000).

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c) Mental disorders as comorbid complications of chronic pain

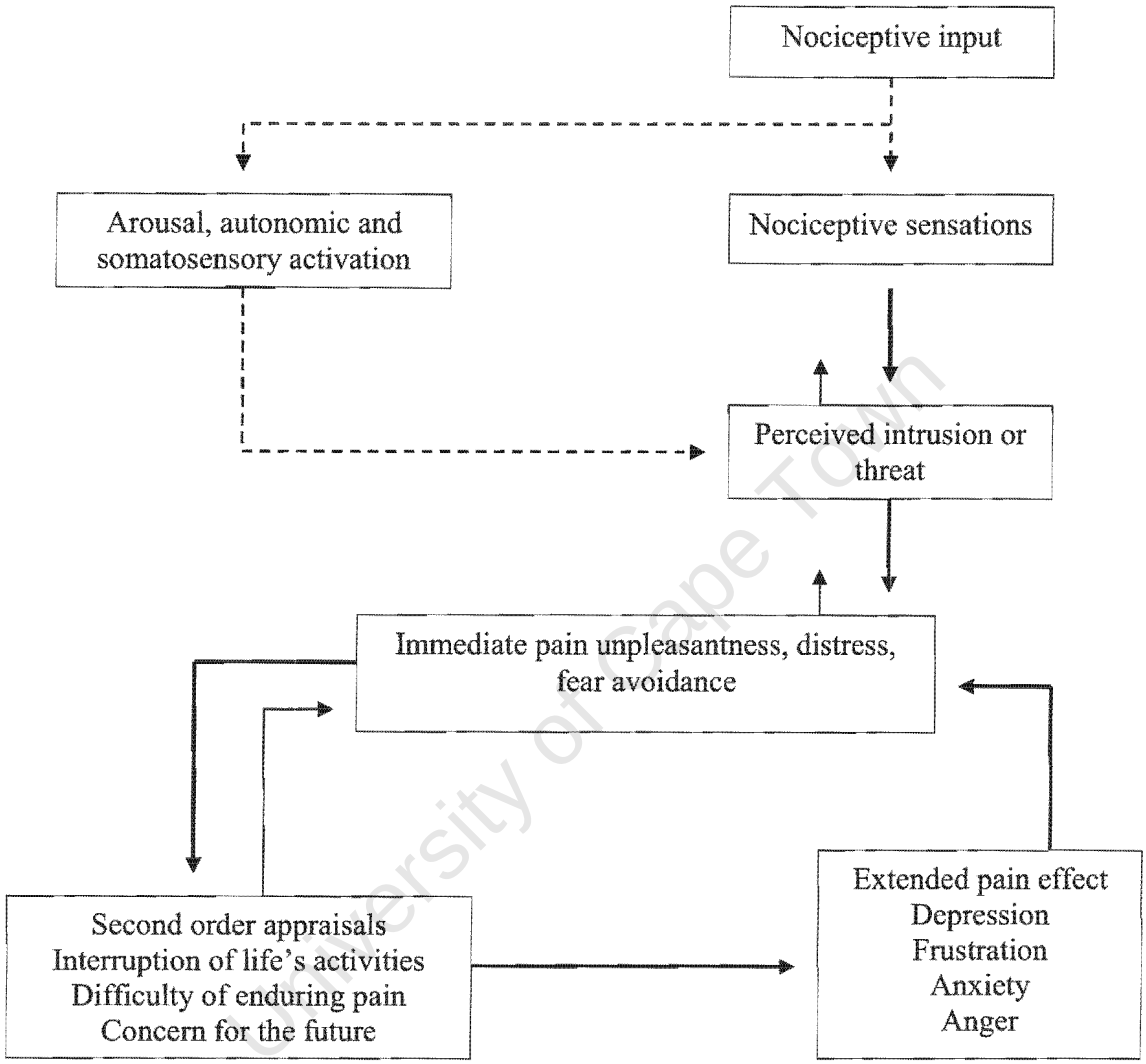
The third approach to the causal mechanism examines the hypothesis which seems to be gaining the greatest credibility: that mental disorders are a comorbid complication of chronic pain (Nicholas 2007). Bair et al. (2003), in a literature review of the comorbidity between chronic pain and depression, state that the prevalence of pain in a depressed sample and the prevalence of depression in a pain sample, are higher than the prevalence rates when individually examined. The authors support the common biological pathway as an attempt to explain the co-existence. In a detailed analysis of longitudinal studies by Von Korff & Simon (1996), the authors explained that a depressed mood is a normal consequence of acute pain, and as time goes on, the level of depression drops slightly as adjustment to the condition occurs. As pain improves, depression levels decrease to those of the normal population, whereas when pain continues, the state of depression is also maintained. They concluded by hypothesising that "chronic depression is one manifestation of an incomplete recovery rather than a psychological state that emerged only as pain became chronic" (Von Korff & Simon 1996: 105).

Mental disorders co-occurring with chronic pain is supported by the recent pain research working on brain imaging (Bond 2006). This research has generated a model (see figure 2) suggesting that noxious stimuli lead to immediate affective change, which gives rise to associated feelings of distress, annoyance or fear, depending on the perceived threat (Price & Bushnell 2004 in Bond 2006). These feelings are influenced by the perception of the short-term future and the circumstances in which the pain occurs (Price & Bushnell 2004 in Bond 2006). Besides sensory, affective and cognitive activity, specific physiological mechanisms are also activated, which include the neuroendocrine, autonomic and somatosensory systems. Although all this activity begins in the acute phase, if pain is not relieved a secondary response leads to an "extended pain effect" (Price & Bushnell 2004 in Bond 2006). It is thus postulated that in chronic pain cases, "more complex emotional changes occur with significant shifts in behaviour towards greater disability" (Price & Bushnell 2004 in Bond 2006: 260).

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Figure 2: Interaction between pain sensation and pain unpleasantness

This interaction is mediated by nociceptive and endogenous physiological factors (indicated by the dashed line), as well as the secondary pain affect (solid lines) - which underpins the chronic pain experience.



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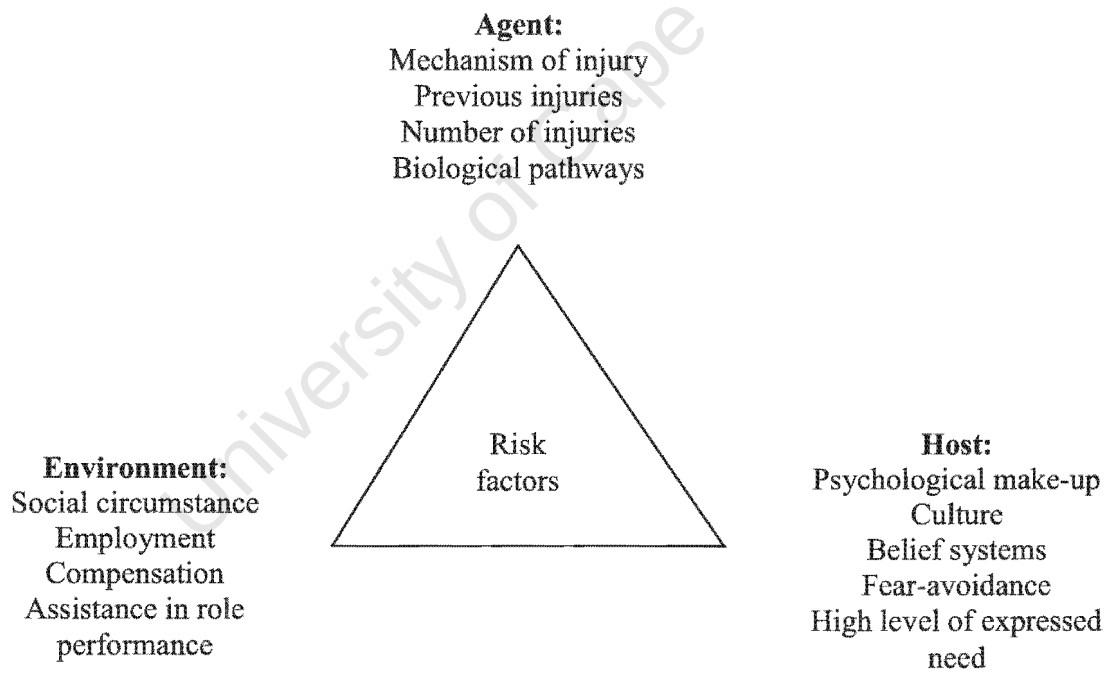
Adapted from Price and Bushnell 2004 in Bond 2004.

From the above discussion of the various theoretical approaches to the causal mechanism, it can be seen that the mechanisms by which chronic pain conditions are associated with mental disorders are not yet fully understood. Two things are clear, however: first, the relationship between chronic pain and mental disorders is a complex process that seems to involve both the internal and external environment of the individual experiencing pain; and second, only by considering all these pathways will the causal mechanism become clearer (Crombie & Davies 2003; Gatchel 2004; Waddell 2004).

II.3.4 Risk factors for the association

The lack of clarity regarding the causal mechanisms behind the association between chronic pain and mental disorders makes identifying risk factors for the association difficult. This is compounded by the diversity of pain and problems with diagnosis (Crombie & Davies 1999). Equally limiting has been the challenge of translating laboratory and clinical findings into the theories that can be investigated in epidemiological studies (Crombie & Davies 1999). Despite these pitfalls, some progress has been made in identifying risk factors for chronic pain and for the association between chronic pain and mental disorders. Once again, it is helpful to view the risk factors from the perspective of the multi-dimensional triad (Figure 3).

Figure 3: Conceptual diagram of the risk factors for the association between chronic pain and mental disorders



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In clinical practice, "yellow flags" have been identified as tools to assist practitioners dealing with patients with pain. This has raised awareness of the psychosocial risk factors for developing chronicity and disability (Watson & Kendall 2002). The "yellow flags" are based on the biopsychosocial model and include patients' beliefs about the nature of their pain (particularly "catastrophic thinking": fearing the worst), behavioural changes (particularly early signs of disability and fear-avoidance), compensation issues (as these affect the locus

of control and a patient may "need to be disabled' in order to achieve compensation), the diagnosis and treatment (what patients have been told by practitioners, a clear diagnosis which validates their experience), emotions (including signs of anxiety, depression and anger) as well as the family (e.g. an over-solicitous spouse) and employment. Not all of these flagged risk factors have been adequately researched; however they appear to provide a useful tool in clinical settings.

Epidemiological studies have found similar risk factors to those included in the "yellow flags". Blair et al. (2004) in a prospective study noted that the presence of depression and a high level of expressed need for treatments were predictors of chronicity. Von Korff & Simon (1996), in a literature review of epidemiological studies, found that interference with activities rather than level of pain intensity, as well as the presence of diffuse somatic symptoms, were independent predictors of depression. Other risk factors for the relationship between chronic pain and depression include being female, aged 45-54, working shifts or at night, being unemployed, being a home-maker, being unmarried or having a poor social support network (Blair et al. 2004; Ohayon & Schatzberg 2003). Additionally, those with chronic pain have an increased risk of mental disorders in the presence of other medical conditions or more than one chronic pain condition (Gureje et al. 2008).

From these findings and what is understood of the causal mechanism, it appears that the association between chronic pain and mental disorders may be mediated, modified or confounded by biological, personal or social factors.

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II.3.5 Confounders of the association

Confounding occurs when a third variable, (not chronic pain or mental disorders) is the reason for the association between chronic pain and mental health. Given the complexity of the association between chronic pain and mental health, some of the confounders of the association may as yet be unidentified. In the past, most research was conducted on clinic patients and there was minimal adjustment for confounding. More recently, age, race, sex and socioeconomics including education and income have been treated as potential confounders (Demyttenaere et al. 2007; Lee et al. 2007; McWilliams et al. 2003; McWilliams et al. 2004; Von Korff et al. 2005). While being older is a risk factor for chronic pain (Currie & Wang 2004; McWilliams et al. 2004; Ohayon & Schatzberg 2003), being

younger is a risk factor for mental disorders (Currie & Wang 2004; Demyttenaere et al. 2007; Patten et al. 2006). Dickens et al. (2002), after adjusting for age, sex and socioeconomic status found no reduction in effect size in the association between arthritis and depression. Furthermore, despite adjustment for perceived potential confounders the association between chronic pain and mental health has persisted in much of the current research conducted in developed countries (Demyttenaere et al. 2007; Lee et al. 2007; McWilliams et al. 2003, McWilliams et al. 2004; Von Korff et al. 2005).

II.3.6 Role of sex in the association

Numerous studies indicate that the prevalence of anxiety and mood disorders is greater in women (Benjamin et al.2000; Currie & Wang 2004; Ohayon & Schatzberg 2003; Patten et al. 2006). Krishnan et al. (1985), however, found men to suffer more from major depression while women suffered more from intermittent depression (as defined by research diagnostic criteria). In addition, women seem to have a higher prevalence of chronic pain and a higher prevalence of multiple sites of chronic pain (Blair et al. 2004; Demyttenaere et al. 2007; McWilliams et al. 2004; Ohayon & Schatzberg 2003). Many of the other factors discussed above which increase the risk of depression (or other mental disorders) and chronic pain conditions – being single, having lower education, having lower income (Currie & Wang 2004; Patten et al. 2006), and being a home-maker (Ohayon & Schatzberg 2003) – apply more commonly to women than men (Doyal 1995). Furthermore, women are more likely to suffer from arthritis than men (Lee et al. 2007). Moreover, arthritis coexisting with other physical or medical health problems, both of which are more prevalent in women, increases the risk of mental disorders (Blair et al. 2004; Gureje et al. 2007). While Currie et al. (2004) found that the impact of back pain was modified by gender, few other studies have assessed whether gender is an effect modifier to the relationship between chronic pain and mental health.

II.3.7 Implications of the association

Mental disorders and chronic pain conditions individually place a substantial burden on society (Blair et al. 2004), yet the combination of chronic back pain and depression is associated with greater disability and disadvantage than either condition on its own (Currie et al. 2004; Lee et al. 2007). Patients with pain conditions and depression are shown to experience more intense pain, more amplification of pain symptoms and longer duration of

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pain, as well as less effective coping skills, impairment in social functioning, higher unemployment rates and diminished patient satisfaction (Bair et al. 2003; Patten et al. 2006). Although the number of people affected by both mental disorders and chronic pain is relatively small, their individual suffering combined with the burden they place on society through the utilisation of healthcare resources and disability insurance is significant (Blair et al. 2004; Waddell 2004). Furthermore, it is understood that when mental disorders coexist with chronic pain disorders, the resolution of either disorder is compromised (Benjamin et al. 2000; Blair et al. 2004; Ohayon & Schatzberg 2003). To further complicate matters, mental disorders often go undiagnosed (McWilliams et al. 2004). This is partly due to the fact that many cases of depression are presented as somatic complaints, predominantly complaints of pain (McWilliams et al. 2004). Conversely, many pain patients make numerous clinic visits, or phone calls to the clinics, to deal with their pain complaints before their depression is identified (Bair et al. 2003).

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II.4 Chronic pain and mental health in Africa

Most of the findings discussed above come from data collected in developed countries; there is a paucity of knowledge concerning both the prevalence of chronic pain and the association between chronic pain and mental health in Africa. In particular, very little information appears available on the burden of chronic pain conditions in the southern African population. At best, we have small amounts of research on employees at occupational organisations or specialised clinics, neither of which are representative of the population. The 1998 South African Demographic and Health Survey (SADHS) reported that musculoskeletal injuries form the highest incidence of work-related injuries. Back pain was the most frequent self-reported injury at work with a projected figure of about 113 400 new or aggravated cases per year in the 9 million South African workers (SADHS 1998). It is important at this point to note that while some back pain results from injuries, many cases have an insidious onset (Waddell 2004) implying that the burden of back pain in South Africa may be considerably greater than indicated by these statistics. A systematic review of lower back pain in Africa (Louw et al. 2007) found that most data came from occupational sources or from scholars. Lower back pain point prevalence in African adults was determined to be 32%, a figure the authors noted was not dissimilar to that of developed societies (Louw et al. 2007). The one-year prevalence for lower back pain ranged between 14% and 72%, again a range comparable with research from developed countries (Louw et

al. 2007). This indicates that back pain could be a far greater burden on society than is recognised. It is important to note however that the wide variation in prevalence may be indicative of variability in the definition of lower back pain, as well as a mix of sample populations, few of which were representative of the population as a whole. Demyttenaere et al. (2007) used the South African Stress and Health Study (SASH) data in their report on the results from the World Mental Health Survey, describing the consistency of association of mental disorders and back or neck pain across 17 countries. They report a prevalence of back or neck pain of 26% for South Africa, the fourth highest prevalence in the study, which ranged from 10% in Columbia to 42% in Ukraine. This strengthens the claim that back and neck pain may be a much overlooked condition in South Africa.

Even less data exists on the prevalence of arthritis in South Africa. The population self-reported prevalence of arthritis was measured for the first time in the 2003 South African Demographic and Health Survey, and was found to be 5% in men and 8% in women (SADHS 2003). In addition, arthritis was more prevalent among those of lower education and those living in urban locations. These findings suggest that arthritis may also require additional attention in the South African context.

Although recent data exists on the 12 month population-based prevalence of mental disorders in South Africa (Williams et al. 2008), there is no data on the association between mental disorders and chronic pain conditions in a South African context. The only African study which seems to report on the relationship between chronic spinal pain and mental disorders was conducted for the World Mental Health Survey in Nigeria (Gureje et al. 2007): Chronic spinal pain had a prevalence of 16.4%, and, like the studies from other parts of the world, was most common in those with no formal education. It was found that 15.8% of those with no mental disorder had chronic spinal pain, while 25.2% of those with mental disorders had chronic spinal pain. The most common mental disorder was substance use disorder (38.3%), followed by mood disorders (30.4%) and then anxiety disorders (23.1%). This is in contrast with most other studies, where substance use disorder is least common. Some other findings also stand out from this study: the reduction in role performance due to chronic spinal pain among Nigerians was 2.9%, whereas in a similar study in the United States (Von Korff et al. 2005), the reduction in role performance was 8%. It is unknown whether this noteworthy difference was due to variation in the type of roles commonly performed by these 2 different societies, or due to their reporting styles (Gureje et al. 2007;

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Von Korff et al. 2005). Another feature of this study is that chronic spinal pain was significantly larger in the older than 60 year group in Nigeria compared with the United States (33.6% and 21.6% respectively). These findings indicate that, while there are similarities between the results from the developed world and Africa, there are also some striking differences.

II.5 SUMMARY

The relationship between chronic pain and mental health is complex, and is best understood using the biopsychosocial framework. The association places a heavy burden on developed societies through disability and increased utilisation of services. Both chronic pain and mental disorders occur more frequently in women than men in developed countries. In addition, many of the risk factors for the association between chronic pain and mental disorders are more prevalent among women. Though it is well recognised in developed countries that an association exists between mental disorders and chronic pain conditions (specifically, the two most common pain conditions: arthritis and chronic back and neck pain), very little is known about either the prevalence of chronic pain or the association with mental disorders in Africa. This is striking, given the high prevalence of chronic pain in developed countries, and the indication that prevalence in Africa may be similar. Adding to the existing prevalence of chronic pain in Africa is the high prevalence of HIV, which is recognised to produce considerable pain during the course of the disease (Gray & Berger 2007). In order to implement appropriate interventions which could prevent disability, and minimise the drain on limited resources, it is urgent that we determine not only the prevalence of chronic pain conditions in South Africa, but also their association with mental disorders.

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III. METHODS

South Africa was one of the participating countries for the WHO World Mental Health (WMH) Survey Consortium. The consortium was initiated in 1998 in an attempt to gather standardised, cross-national data on the epidemiology of mental health, in response to the dramatic findings on the worldwide burden of mental health in the Global Burden of Disease study in 1996 (Ustun 1999). The WMH initiative aimed to asses not only prevalence but also the severity of mental disorders, associated impairment and their treatment in both developing and developed countries. This was done using a single instrument, the Composite International Diagnostic Interview version 3 (Demyttenaere et al. 2004). The South African research was called the South African Stress and Health Study (SASH). The rationale of the WMH Survey (Demyttenaere et al. 2004) and that of SASH, as well as the design of SASH, have been described in detail previously (Williams et al. 2004).

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III.1 STUDY DESIGN

The SASH was a large, cross-sectional survey of mental health among South African adults. Data collection for this study took place over two years from January 2002 to June 2004. The study used the same standardised assessment tool, training techniques of interviewers, standardised translation protocol and field procedures as that stipulated for all WMH surveys, thus making the findings easily comparable between countries.

III.1.1 Ethics

Ethics approval for the recruitment, field procedures and consent of the SASH was granted by the Human Subjects Committees of the University of Michigan and Harvard Medical School, as well as by the Medical University of South Africa (MEDUNSA). This dissertation is part of a larger project which received ethical approval from the Human Subjects Committee of the University of Stellenbosch. This dissertation, which analyses a portion of the SASH data, received ethical approval from the Research Ethics Committee of the Faculty of Health Sciences at the University of Cape Town (REC REF: 281/ 2008). Informed consent was gained from each respondent prior to participation in the questionnaire.

III.1.2 Survey population

The SASH survey population was a nationally-representative probability sample. The sample design and methods are described in detail in Heeringa (2005). The sample consisted of adult South Africans residing in hostels or households during the field period. Hostels were included in order to ensure maximum coverage of young working-age males. Individuals 18 years and older of all races and ethnicity were included in the study, except those living in prisons, mental institutions or hospitals. Military personnel living on military bases were also excluded from the study.

III.2 SAMPLING

The sampling for the SASH was the result of a three-stage clustered area probability sample design. The area-based sample frame was developed from the 2001 Census of South Africa Enumeration Area (EA) maps and population data (Heeringa 2005). The three stages involved first selecting stratified EAs, then selecting housing units in clusters within the EAs, and finally selecting one adult respondent from each sample housing unit. These three stages are outlined in more detail below.

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III.2.1 First-stage sampling

South Africa's land area is divided into 85 783 geographic EA units, which are categorised into 53 strata, depending on which province they were selected from, whether it was a rural or urban area, and the majority population group in the EA (i.e. Coloured, African, Indian/Asian or White). For the SASH data, 960 probability primary sampling units (PSUs), which were EAs from the census, were selected from the 53 strata in such a way that they were proportionate to the population size (Heeringa 2005).

III.2.2 Second-stage sampling

Before the second stage of sampling began, census maps and aerial photographs of remote areas were utilised to draw up an enumerative list of dwelling areas for each of the 960 selected EAs. On their first visit, interviewing teams updated the pre-prepared lists of dwelling units to include any missing units. From these corrected lists, a random sample of 5

dwellings was selected for contact and interview from each EA. The SASH study selected a total sample of 5089 households (Heeringa 2005).

III.2.3 Third-stage sampling

Each dwelling had one adult respondent randomly selected from it. The Kish procedure was used to ensure objective random selection (Kish 1965). If households or the selected respondent refused to participate, then a random replacement was drawn from the enumerative list. This procedure introduces an adjustment for non-response that was not endorsed by the WMH Initiative data collection coordinating centre. However, the initial response rate was high (87.1%) and therefore the anomaly was considered unlikely to seriously affect the representativeness of the final survey (Heeringa 2005).

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III.2.4 Sample outcomes

Data were collected systematically from each province by cohorts of 40 to 60 trained field interviewers. These interviewers made up to 3 attempts to contact respondents. Of the designated respondents, 4 433 field interviews were obtained. After quality control of the interviews, including completion of critical sections in the SASH questionnaire, 4 351 (98.1%) were retained for analysis. Response rates across the ethnic groups were found to be similar except for those from respondents with high socioeconomic status, predominantly white urban areas, where the quality of responses was lower. The SASH data-set included person-level analysis weights that incorporated sample selection, non-response and post-stratification factors. These weights were used for both descriptive and analytical statistics, in order to adjust for the complex study design.

III.2 MEASUREMENT INSTRUMENT

The World Mental Health pencil and paper version of the WHO CIDI questionnaire was used in the SASH study. The WMH-CIDI version 3.0 is a fully structured interview administered by trained laypersons, generating diagnoses for mental disorders in accordance with the criteria from the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) diagnostic systems. The DSM-IV, published in 1994, and updated in 2000 to DSM-IV-TR, contains all the official nomenclature used in the United States by psychiatrists and other

mental health practitioners (Sadock &Sadock 2003). In this dissertation, DSM-IV diagnostic criteria were used.

The purpose of the WMH-CIDI questionnaire was to investigate large-scale, population-based epidemiological mental health surveys around the world. The SASH Survey was altered slightly from the original in order to make it more specific to the South African population, and some sections of the CIDI were omitted in order to curtail the time it took to complete the questionnaire. The validity and inter-rater reliability for the WMH-CIDI have been previously tested and have shown good outcomes (Kessler & Ustun 2004; Williams et al. 2008). 12-month versions of anxiety disorders, mood disorders, and substance use disorders were assessed in the SASH study. In addition, socioeconomic and demographic correlates were also collected, along with other chronic physical diseases.

The SASH interviewers were trained at a centralised location for 1 week; only those who were fully conversant with the measurement instrument then went on to do the fieldwork. Interviews were conducted face-to-face in the respondent's home in English, Afrikaans, Zulu, Xhosa, Northern Sotho or Tswana. Interviews lasted approximately 3.5 hours, and in many cases required more than one visit to complete.

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III.3 VARIABLES

This section describes in detail the variables used to measure chronic pain conditions, mental disorders, demographic information, other chronic pain and medical conditions, and traumatic life events.

III.3.1 Chronic pain conditions

Two different chronic pain conditions – arthritis/rheumatism and chronic back/neck pain– were analysed in this dissertation. These variables were all self-reported in the chronic conditions section of the questionnaire. The question was worded as follows:

The next few questions are about health problems you might have had at any time in the past 12 months. Have you had any of the following in the past 12 months?

a) Arthritis or rheumatism?
b) Chronic back or neck problems?

Respondents had the option to answer "yes", "no", "don't know" or "refused". Observations that were coded as "refused" or "don't know" were not included. On the whole questions were well-answered for these conditions, with a response rate of over 95% for both arthritis/rheumatism and chronic back/neck pain. A binary yes/no variable was created for each of these chronic pain conditions. For the purposes of this dissertation, the variable for "arthritis or rheumatism" has been called "arthritis/rheumatism" and the variable for "chronic back or neck problems" has been called "chronic back/neck pain". Throughout this dissertation, "chronic pain conditions" refers to both arthritis/rheumatism and chronic back/neck pain.

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III.3.2 Mental disorders

12-month DSM-IV diagnoses of major depressive disorder, anxiety disorders and alcohol abuse or dependence disorders were assessed in this dissertation. A variable called "any mental disorders" was created to include a positive response to any of the mental disorders analysed in this study. For any of the diagnoses to be used DSM-IV criteria needed to be met for all of the following listed mental disorders (see Appendices 1-6 for DSM-IV criteria).

III.3.2.1 Major depressive disorder

Major Depressive Disorder (MDD) is a mood disorder defined by one or more major depressive episodes (Sadock & Sadock 2003). A major depressive episode must last at least 2 weeks and typically a person diagnosed with a major depressive episode also experiences at least 4 symptoms from a list that includes change in sleep and activity, lack of energy, change in appetite and weight, feelings of guilt, problems thinking and making decisions, and recurring thoughts of death or suicide (Sadock & Sadock 2003). The DSM-IV criteria for diagnosis of MDD are outlined in Appendix 1. Dysthmia is not assessed in this dissertation due to the fact that 12-month prevalence was shown to be extremely rare (only

one case) in previous analysis of 12-month mental disorders from the SASH data (Williams et al. 2008: 5).

III.3.2.2 Anxiety disorders

The anxiety disorders included in this dissertation were: (i) panic disorder without agoraphobia, (ii) agoraphobia without panic, (iii) social phobia, (iv) post-traumatic stress disorder (PTSD) and (v) generalised anxiety disorder (GAD). The DSM-IV criteria for each of these disorders are described in Appendices 2-6.

(i) Panic disorder without agoraphobia is characterised by the unexpected, spontaneous occurrence of panic attacks, which are discrete episodes of intense fear that vary from several attacks in 1 day to only a few attacks during a year (Sadock & Sadock 2003). In this dissertation, panic disorder without agoraphobia has been called "panic disorder".

(ii) Agoraphobia (without panic disorder) is described as the fear of being alone in public places, particularly places from where a rapid exit would be difficult, e.g. supermarkets. Agoraphobia is considered one of the most disabling phobias because it can significantly interfere with a person's ability to function in work or social situations outside the home (Sadock & Sadock 2003). In this dissertation, the variable agoraphobia without panic has been called "agoraphobia".

(iii) Social phobia is a strong, persisting fear of situations in which embarrassment can occur. Social phobia is also called social anxiety disorder, and manifests as persons with excessive fear of humiliation or embarrassment in various social settings like public speaking, speaking to a date, urinating in public lavatories, etc. Social phobia is likely to produce conscious avoidance of the feared situation (Sadock & Sadock 2003).

(iv) PTSD is a syndrome that develops after a person hears about, sees, or is involved in, an extreme traumatic stressor. The person's reaction to this experience is one of fear and helplessness; they persistently re-live the event and try to avoid being reminded of it. For a diagnosis to be made, these symptoms should last for longer than 1 month after

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the event and should significantly affect important areas of life such as family and work (Sadock & Sadock 2003).

(v) GAD is defined as excessive worry and anxiety about several events or activities for most days during at least a 6-month time period. This worry is difficult to control and is associated with somatic symptoms such as irritability, restlessness, difficulty sleeping and muscle tension. The anxiety is also difficult to control, is subjectively distressing, and produces impairment in important areas of a person's life. GAD is commonly diagnosed in people who seem to be anxious about almost everything (Sadock & Sadock 2003).

A variable was also created called "any anxiety disorder" which included a positive response to any of the above anxiety disorders. Variables were coded as binary yes/no variables. Variables that were missing or refused were coded as not having the outcome for "any anxiety disorder".

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III.3.2.3 Alcohol-related disorders

Alcohol abuse and dependence manifest in alcohol intoxication, which can lead to violent behaviour, irritability, feelings of depression and (in rare instances) hallucinations and delusions. Long-term and escalating use of alcohol can cause tolerance in the body to such a degree that cessation precipitates a withdrawal syndrome usually marked by evidence of hyperactivity of the autonomic nervous system like feelings of anxiety and insomnia (Sadock & Sadock 2003).

(i) Alcohol abuse is define as one or more of the following events in a year: recurrent use in hazardous situations, recurrent use resulting in failure to fulfil major role obligations, recurrent alcohol-related legal problems (e.g. convictions for driving under the influence), continued use despite interpersonal or social problems exacerbated or caused by alcohol (Sadock & Sadock 2003: 396).

(ii) Alcohol dependence is defined as 3 or more of the following events in a year: diminished effects from the same alcohol; tolerance; increased amount to achieve

effect; withdrawal; spending a great deal of time obtaining or using alcohol; giving up or reducing important activities because of alcohol; drinking more or for longer than intended; persistent desire or unsuccessful effort to cut down or control alcohol use; continued use despite knowledge of a psychological problem caused or exacerbated by alcohol (Sadock & Sadock 2003: 396).

For the purposes of this study, the presence of a DSM-IV diagnosed alcohol abuse or dependence disorder was considered as one variable called "alcohol-related disorders". This variable was coded as a binary yes/no variable. Variables that were missing or refused were coded as not having the outcome.

III.3.3 Demographic variables

Demographics of race, age and marital status were self-reported from the questionnaire, as indicated in the table below:

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Category	Question in questionnaire	Variables generated
Race	What is your racial background?	Black Coloured White/Caucasian Indian/Asian
Age	How old are you?	18-29 30-39 40-49 50-59 60+
Marital Status	Are you currently married?	Married Unmarried

Race has an historical context in South Africa, as it was institutionalized by the apartheid government and was used as a means of control and social division. Peoples of different races were formalised into population groups which were used in socioeconomic and health data (Myer et al. 2004). Due to the formalised inequalities where racial groups of "Whites" were given first-world opportunities and "Blacks, Coloureds and Indians/Asians" were afforded significantly reduced opportunities (Myer et al. 2004; Myer et al. 2008), racial grouping is still used in research today as a proxy for socioeconomic status, and in order to allow current research to be comparable with historical research in health. Sex was

determined by the interviewer, and was classified into male or female. Location of rural or urban was taken from the EA classification of the area. Location is also a proxy for socioeconomic status as historically, people living in rural areas have had less access to employment, education and formal economic services (Myer et al. 2008).

III.3.3.1 Socioeconomic position

Socioeconomic position was assessed through a number of questions in the questionnaire related to family income, education and employment. Family income was analysed using the following categories: 0, R1-R5 000, R5 001-R25 000, R25 001-R100 000 and R100 000+ in the past 12 months. Education was analysed by 5 categories: none, grade 1-7, grade 8-11, grade12/matric completed, and matric+. Employment was classified as a dichotomous variable of employed or unemployed. An additional method of assessing socioeconomic position using asset indices has been established for developing countries, due to the fact the above traditional variables do not take into account informal economy or resource sharing, which is common in developing countries (Myer et al. 2004). The asset index generated for this study was based on 17 items owned by the individual or family which reflected household and individual wealth (Myer et al. 2008). It was divided into: appliances owned by the household (television, fridge/freezer, hi-fi or music centre (excluding a radio), polisher/vacuum cleaner, microwave oven, washing machine, video cassette recorder); other household resources (flush toilet, domestic servant, telephone, working-order car, running water, built-in sink, electric stove/hotplate); and personal financial activities (using an automatic teller machine or having a bank account, shopping at a supermarket, using an account or credit card at a retail store). This asset index has been tested and shown to have excellent reliability (Cronbach's alpha, 0.92) (Myer et al. 2008). From the results, aggregate asset scores were created into 3 categories, viz. 0-5; 6-12; 13-17 assets. In this study, measures of SES from personal and family income, education and employment, and aggregate asset scores were represented; as well as an aggregate measure using all of the above data to represent SES in tertiles of low, moderate and high SES.

III.3.4 Other chronic pain and medical conditions

Chronic pain conditions other than arthritis/rheumatism and chronic back/neck pain were summated into one category from respondents' answers (yes/no) to the questions "have you had any of the following in the past 12 months? Frequent or severe headaches and or any

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other chronic pain." Positive answers to this question formed a positive response to the new category of "other chronic pain".

A category for medical conditions was created and called "other medical conditions" for any positive (yes) answer to the following questions:

Have you had any of the following in the past twelve months?
Seasonal allergies like hay fever
A stroke
A heart attack

Did a doctor or other health professional ever tell you that you had any of the following illnesses?
Heart disease
High blood pressure
Asthma
Tuberculosis
Chronic Obstructive Pulmonary Disease (COPD)
Malaria or some other parasitic disease
Diabetes or high blood sugar
An ulcer in your stomach or intestine
Thyroid disease
A neurological problem like multiple sclerosis, Parkinson's or seizures
HIV infection or AIDS
Epilepsy or seizures
Cancer

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For all of the above variables, answers that were missing or refused were coded as not having the outcome of "other medical conditions".

III.3.5 Traumatic life events

Variables for traumatic life events were taken from the 28 screening questions for post-traumatic stress disorder. Variables were made for none, 1-2, 3-4, >5 traumatic life events. Further variables were created for physical traumas, namely accidents and beatings, which again were taken from the 28 screening questions for PTSD. These were divided into binary (yes/no) variables as follows:

Question as asked in questionnaire	Variable name in dissertation
Were you ever involved in a life-threatening automobile accident?	Life-threatening motor vehicle accident
Did you ever have any other life-threatening accident, including on your job?	Life threatening other accident
As a child, were you ever badly beaten up by your parents or the people who raised you?	Beaten badly as child
Were you ever badly beaten up by a spouse or romantic partner?	Beaten badly by spouse
Were you ever badly beaten up by anyone else?	Beaten badly by other

In addition, a variable that included the two questions on life-threatening accidents was created and called "ever in a life-threatening accident". Similarly, an additional variable combining the three questions on being badly beaten was created and called "ever beaten badly". In all cases, answers which were "refused" or "missing" were coded as not having the outcome of interest.

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III.4 Data Analysis

Data were analysed using STATA Version 10.0 (Stata Corporation, College Station, USA). The complex survey design was accounted for in all the analyses by weighting the person-level data in order to adjust for differential probabilities of selection within households and differential non-response. In addition, a post-stratification weight was used to make the sample distribution comparable to the population distribution of the 2001 Census.

III.4.1 Univariate analyses

The prevalence and proportions of demographic and socioeconomic variables, as well as other variables (other chronic pain, other medical conditions and traumatic life events) were determined from the total sample and stratified by sex, as well as by arthritis/rheumatism versus no arthritis/rheumatism, and by chronic back/neck pain versus no chronic back/neck pain. In addition, the prevalence and proportions of all 12-month mental disorders and chronic pain conditions were calculated, and stratified. P-values were determined for stratified analyses to compare proportions using Pearson's chi-squared test of association. All statistical tests were two sided, with $\alpha = 0.05$.

III.4.2 Unadjusted analyses

Logistic regression analyses were performed to calculate the crude odds ratio (OR) and 95% confidence intervals (CI) for the associations between chronic pain conditions – (i) arthritis/rheumatism and (ii) chronic back/neck pain – and 12-month mental disorders – (a) all specific anxiety disorders, (b) major depressive disorder and (c) alcohol-related disorders. In each case, the comparison group did not have the outcome of interest. These associations were examined using a corrected t-test for comparison of means and Pearson's chi-squared test for comparison of proportions.

III.4.3 Multivariate analyses

Multiple logistic regression models were developed to determine the independent association between (i) arthritis/rheumatism and the abovementioned mental disorders, and (ii) chronic back/neck pain and the abovementioned mental disorders. Model A adjusted for age, race, location and marriage; model B added sex; model C added socioeconomic tertiles; model D added other medical conditions; model E added other chronic pain and model F added traumatic life events.

Model F, above, was additionally used to determine (a) the independent predictors of chronic pain and (b) the independent association between the abovementioned mental disorders and chronic pain conditions in women and men separately. Multiple logistic regression was also used to determine the independent association between physical traumas and (i) arthritis/rheumatism and (ii) chronic back/neck pain, adjusting for sociodemographics, other chronic pain and other medical conditions.

Finally, effect modification for the association between the abovementioned chronic pain conditions and mental disorders was assessed by entering a cross-product term for male/female sex and the chronic pain conditions into the crude and adjusted (model F) associations for each type of disorder. The interaction term was (i) male/female sex multiplied by arthritis/rheumatism and (ii) male/female sex multiplied by chronic back/neck pain. From this, the degree of difference between men and women in the association between chronic pain conditions and 12-month mental disorders was compared.

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IV. RESULTS

This chapter deals separately with the univariate analyses and unadjusted analyses, before describing the results of the multivariate analyses, split between an examination of adjusted associations, independent predictors of chronic pain, and sex as an effect modifier.

IV.1 UNIVARIATE ANALYSES

In this section, the sample is described in terms of sociodemographics and traumatic life events, chronic pain and mental disorders, and the relationship between chronic pain and mental disorders.

IV.1.1 Sociodemographics and traumatic life events

The total number of people included in the SASH study was 4 351. The demographic and socioeconomic characteristics, as well as exposure to traumatic life events, are presented in table 1. The majority of the population (60.9%) was 30 years old or older. Just over half were female (53.7%). Black people made up the biggest race group (76.2%) followed by Coloureds, Whites and Indians, which is representative of the South African population. Urban residence comprised 61.6%, and only 38.8% had completed matric or had any post-matric education. The majority of the sample population (78.2%) had a family income of less than R100 000 per annum, although the distribution of assets and overall socioeconomic status were fairly evenly divided between the three categories (see Table 1). It is particularly noteworthy that the majority of the sample (73.4%) had experienced at least one traumatic life event.

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Table 1 also indicates the differences between males and females in the study. It is interesting to note that more males (43.8%) had completed matric or post-matric education than females (34.4%; $p = 0.007$); more males were employed (39.3%) compared with females (23.9%; $p < 0.001$); and more males (40.8%) were classified in the high SES group than females (32.4%; $p < 0.001$) (see Figure 4). A greater proportion of males (15.4%) was ever involved in life-threatening accidents (females: 10.7%; $p<0.0011$), whereas a greater proportion of females (14.2%) was ever beaten badly (males: 10.6%; $p = 0.0029$). This difference was most striking in those beaten badly by a spouse/romantic partner, where

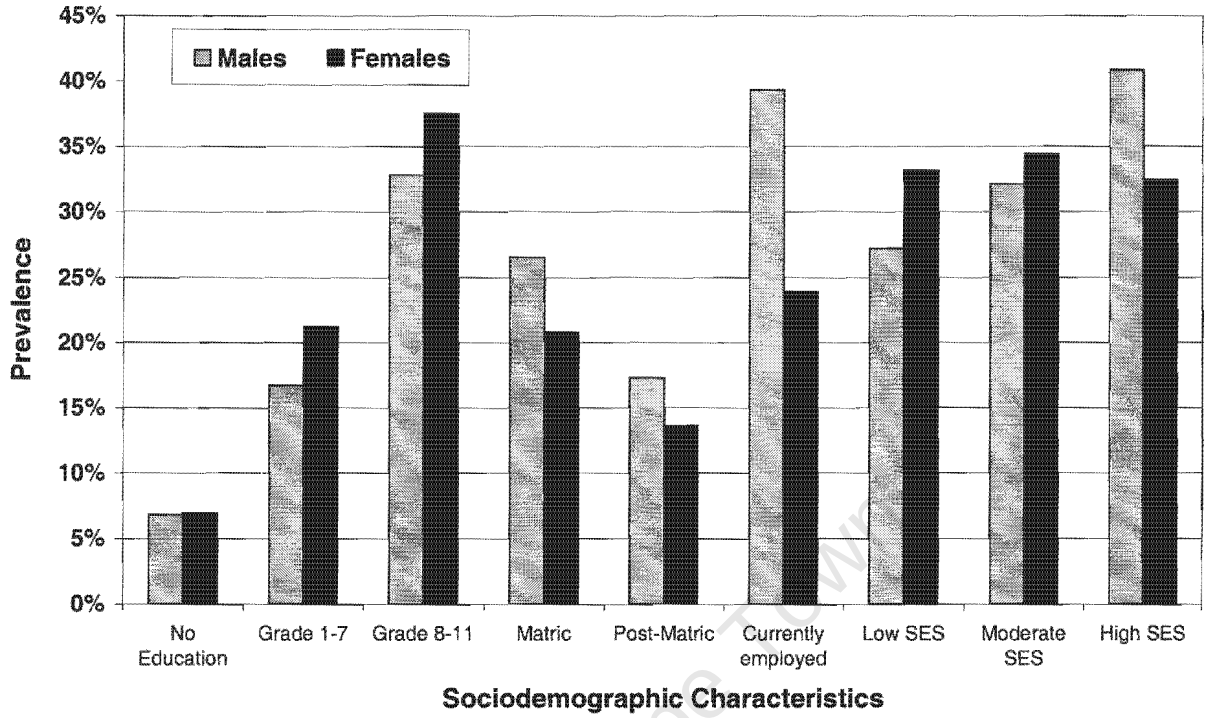
women were predominantly affected (6.3%) compared with men (0.6%; $p < 0.001$) (see Figure 5).

Table 1: Description of sociodemographics and traumatic life events of sample

Demographic characteristics	Categories	Total	Males	Females	p-value
		%	%	%	
Age in years	18-29	39.1	42.5	36.2	0.007
	30-39	22.1	21.0	23.0	
	40-49	18.1	17.0	19.1	
	50-59	12.0	12.0	12.1	
	60+	8.7	7.6	9.7	
Sex	Female	53.7	-	53.7	
	Male	46.3	46.3	-	
Race	Black	76.2	76.5	76.0	0.589
	Coloured	10.4	9.8	11.0	
	White	10.0	11.0	9.4	
	Indian/Asian	3.4	3.1	3.6	
Marital Status	Currently married	50.1	47.9	52.0	0.038
	Currently unmarried	49.9	52.1	48.0	
Location	Urban	61.6	64.3	59.3	0.007
	Rural	38.4	35.7	40.7	
Education	None	6.8	6.8	6.9	<0.001
	Grade 1-7	19.1	16.7	21.2	
	Grade 8-11	35.4	32.8	37.5	
	Matric	23.5	26.5	20.8	
	Matric+	15.3	17.3	13.6	
Employment status	Currently employed	31.0	39.3	23.9	<0.001
	Currently unemployed	69.0	60.8	76.1	
Family Income in past 12 months	None	13.7	13.8	13.5	0.293
	R1-5000	29.5	27.6	31.2	
	R5001-25 000	15.4	16.3	14.6	
	R25 000 -100 000	19.6	19.6	19.6	
	R100 000+	21.8	22.7	21.1	
Asset Index	None-5	39.3	36.8	41.5	0.025
	6-12	37.4	38.6	36.4	
	13-17	23.3	24.6	22.1	
Socioeconomic status	Low	30.4	27.2	33.2	<0.001
	Moderate	33.3	32.1	34.4	
	High	36.3	40.8	32.4	
Traumatic life events	None	26.6	25.6	27.5	0.208
	1-2	49.9	49.1	50.6	
	3-4	10.8	11.5	10.1	
	>5	12.7	13.7	11.7	
Life threatening accident	Ever	12.9	15.4	10.7	<0.001
	Motor vehicle accident	10.0	11.5	8.7	0.009
	Other accident	2.9	3.9	1.9	0.010
Beaten badly	Ever	12.5	10.6	14.2	0.003
	As child, by caregivers	5.5	5.1	5.9	0.248
	By spouse	3.6	0.6	6.3	<0.001
	By other	3.4	4.9	2.1	<0.001

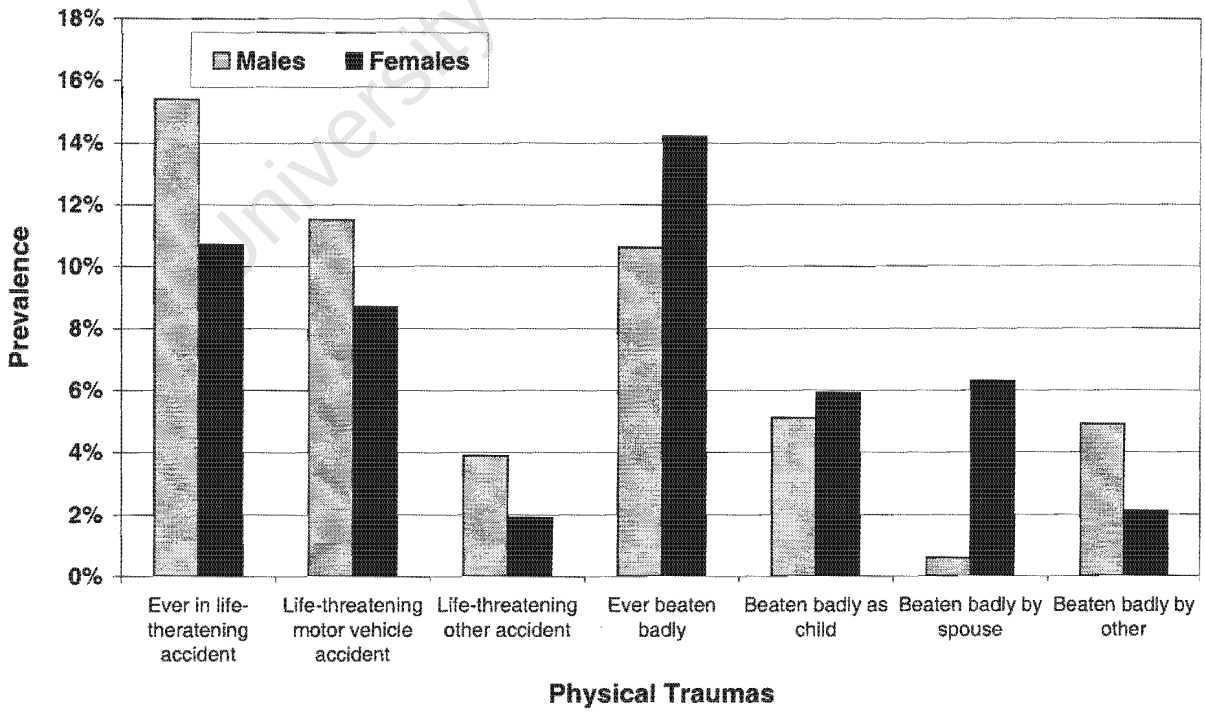
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Figure 4: Prevalence of education, employment and socioeconomic status in men and women



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Figure 5: Prevalence of physical traumas in men and women



IV.1.2 Chronic pain and mental disorders

Table 2 describes the prevalence of chronic pain conditions as well as mental disorders in the sample population and also compares the results between males and females. Of the two chronic pain conditions considered in this study, 26.3% of the study population reported having chronic back/neck pain, while 10.1% reported having arthritis/rheumatism. It is worth noting that 48.1% of the sample population reported having some form of chronic pain, clearly indicating that chronic pain is a significant burden for the South African population.

Anxiety disorders (8.3%) formed the largest proportion of mental disorders, with agoraphobia (4.8%) predominating; however, in terms of individual mental disorders, alcohol-related disorders were most common (4.9%), with major depressive disorder following closely (4.8%).

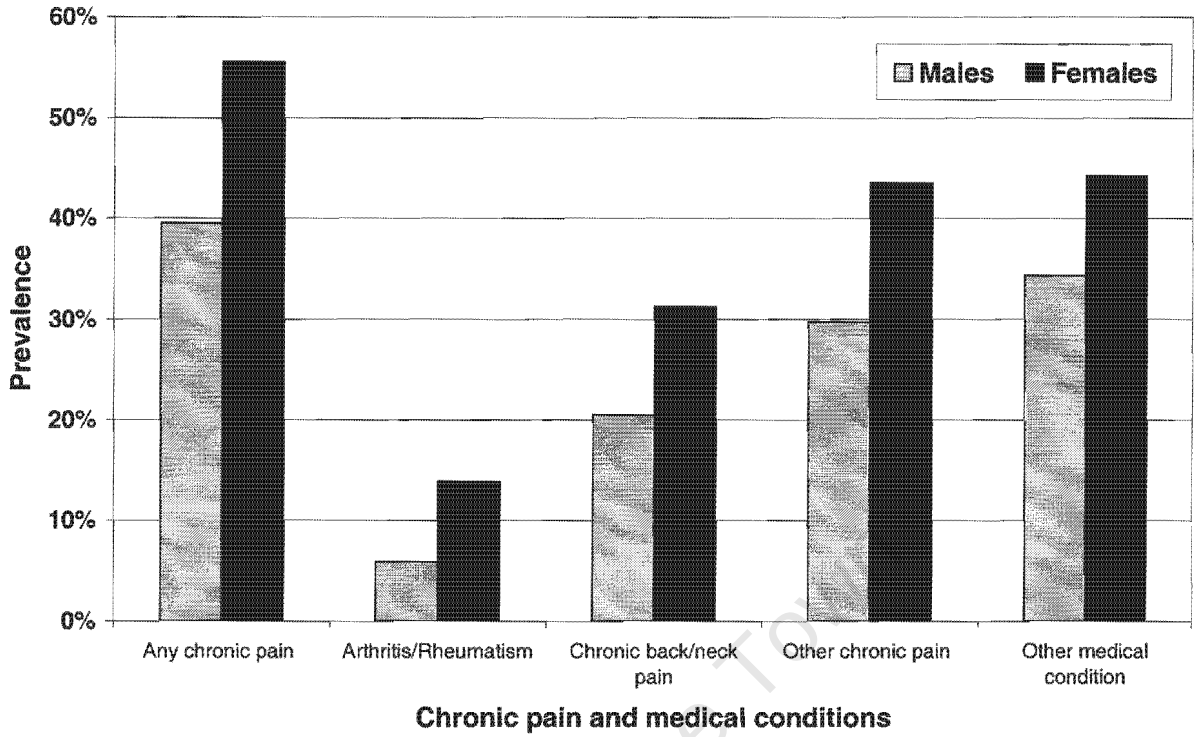
It is significant that in both chronic pain conditions, women were more affected (see Table 2) Women also had the greater proportion than men (44.2%) of both other medical conditions (34.3%; $p < 0.001$) (see Figure 6) and also anxiety disorders (10.9% vs. 5.3%; $p < 0.001$), except for PTSD which was more or less equally distributed between the sexes. Females had a higher proportion of MDD (6.4% vs. 3.0%; $p = 0.001$), whereas males had a higher proportion of alcohol-related disorders (8.1% vs. 2.2%; $p<0.001$) (see Figure 7).

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Table 2: Prevalence of chronic pain conditions and DSM-IV 12-month mental disorders in sample

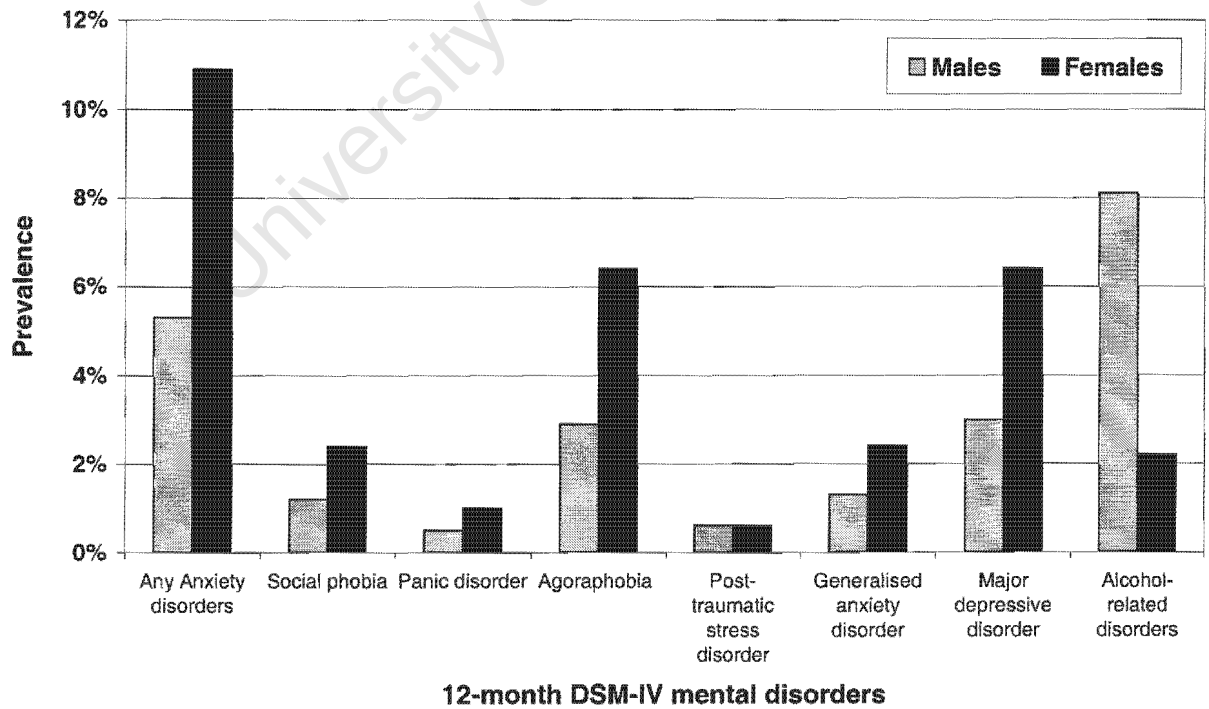
	Total	Males	Females	p-value
	%	%	%	
Any chronic pain	48.1	39.5	55.5	<0.001
Arthritis/rheumatism	10.1	5.9	13.8	<0.001
Chronic back/neck pain	26.3	20.5	31.3	<0.001
Other chronic pain	37.1	29.7	43.5	<0.001
Other medical conditions	39.6	34.3	44.2	<0.001
Any anxiety disorders	8.3	5.3	10.9	<0.001
Social phobia	1.9	1.2	2.4	0.011
Panic disorder	0.8	0.5	1.0	0.040
Agoraphobia	4.8	2.9	6.4	<0.001
PTSD	0.6	0.6	0.6	0.865
GAD	1.9	1.3	2.4	0.010
Major depressive disorder	4.8	3.0	6.4	<0.001
Alcohol-related disorders	4.9	8.1	2.2	<0.001

Figure 6: Prevalence of chronic pain and medical conditions in men and women



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Figure 7: Prevalence of 12-month DSM-IV mental disorders in men and women



IV.1.2.1 Chronic pain conditions

A. Arthritis/rheumatism

Table 3 describes the sociodemographic characteristics of those with and without arthritis/rheumatism. There was a strong relationship between increasing age and the occurrence of arthritis/rheumatism: 77% of individuals with arthritis/rheumatism were over the age of 40, compared with 34% of individuals without arthritis/rheumatism ($p < 0.001$). Seventy-three percent of those with arthritis/rheumatism were females, compared with 26.9% males, while the proportion of those without arthritis/rheumatism was almost equal between men and women. Arthritis/rheumatism was more common among those who were married, lived in an urban location, were unemployed, or had a lower socioeconomic status. Arthritis/rheumatism also occurred more among those with sub-matric education (79.9%).

Chronic back/neck pain (68.1%) and other chronic pain conditions (63.2%) as well as chronic medical conditions (77.9%) formed a substantially higher proportion of those with arthritis/rheumatism than those without arthritis/rheumatism. Those with arthritis/rheumatism had a greater proportion of traumatic life events than those without arthritis/rheumatism; particularly noticeable was the result that 6.0% of those with arthritis/rheumatism had been beaten badly by a spouse, while only 3.4% of those without arthritis/rheumatism had been beaten badly by a spouse ($p = 0.004$).

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Table 3: Description of sample prevalence stratified by self-reported arthritis/rheumatism

Demographic characteristics	Categories	No arthritis/ rheumatism	Arthritis/ rheumatism	p-value
		%	%	
Age in years	18-29	42.5	9.4	<0.001
	30-39	23.0	13.5	
	40-49	17.7	20.6	
	50-59	10.3	27.3	
	60+	6.5	29.2	
Sex	Female	51.5	73.1	<0.001
	Male	48.5	26.9	
Race	Black	76.8	71.8	0.257
	Coloured	10.3	12.1	
	White	9.7	12.5	
	Indian/ Asian	3.3	3.6	
Marital Status	Currently married	48.5	64.7	<0.001
	Currently unmarried	51.6	35.3	
Location	Urban	61.4	62.0	0.811
	Rural	38.6	38.0	
Education	None	5.9	14.4	<0.001
	Grade1-7	17.4	33.9	
	Grade 8-11	35.8	31.6	
	Matric	25.1	9.8	
	Matric+	15.9	10.3	
Employment status	Currently employed	32.1	22.3	0.011
	Currently unemployed	67.9	77.7	
Family Income	None	13.3	17.5	0.063
	R1-5000	29.3	33.0	
	R5001-25 000	15.6	13.9	
	R25 000 -100 000	19.7	17.5	
	R100 000+	22.1	18.0	
Asset Index	None-5	38.2	46.1	0.023
	6-12	38.2	32.2	
	13-17	23.6	21.7	
Socioeconomic status	Low	27.9	50.6	<0.001
	Moderate	34.3	23.6	
	High	37.8	25.8	
Chronic back/neck pain		21.6	68.1	<0.001
Other chronic pain		34.4	63.2	<0.001
Other medical conditions		35.5	77.9	<0.001
Traumatic life events	None	27.6	17.8	<0.001
	1-2	50.0	50.4	
	3-4	10.5	12.3	
	>5	11.8	19.5	
Life threatening accident	Ever	12.6	15.9	0.106
	Motor vehicle accident	9.8	12.5	0.138
	Other accident	2.8	3.4	0.466
Beaten badly	Ever	12.6	11.9	0.697
	As child, by caregivers	5.7	4.3	0.353
	By spouse	3.4	6.0	0.004
	By other	3.6	1.5	0.042

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B. Chronic back/neck pain

Table 4 describes the sociodemographic characteristics of those with chronic back/neck pain. While the greatest proportion of chronic back/neck pain was among those between the ages of 18 and 49, those with chronic back/neck pain were significantly older than those without chronic back/neck pain ($p < 0.001$). For example, 15% of those with chronic back/neck pain were sixty years old or older, whereas only six percent of those without chronic back/neck pain were sixty years old or older. More chronic back/neck pain occurred among women (63.9%), compared with equal proportions of men and women without chronic back/neck pain. Those who were married, lived in urban areas, were unemployed, had grade 11 or less education, or were from a lower socioeconomic status, had a greater proportion of chronic back/neck pain.

Among those with chronic back/neck pain, there was a significantly high proportion of arthritis/rheumatism (26.1%), other chronic pains (63.7%) and other chronic medical conditions (65.1%) compared with those without chronic back/neck pain ($p < 0.001$). People who had chronic back/neck pain were exposed to more traumatic life events than those without chronic back/neck pain. Those with chronic back/neck pain were more likely to have been in a life-threatening accident (15.4%) or beaten badly by a spouse (5.4%), compared with those without chronic back/neck pain.

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Table 4: Description of sample prevalence stratified by self-reported chronic back/neck pain

Demographic characteristics	Categories	No chronic back/neck pain	Chronic back/neck pain	p-value
		%	%	
Age in years	18-29	44.3	24.7	<0.001
	30-39	22.7	20.6	
	40-49	16.7	22.0	
	50-59	10.0	17.7	
	60+	6.4	15.1	
Sex	Female	50.0	63.9	<0.001
	Male	50.0	36.2	
Race	Black	75.8	77.5	0.121
	Coloured	10.3	11.0	
	White	10.7	7.6	
	Indian/ Asian	3.2	3.9	
Marital Status	Currently married	47.1	58.5	<0.001
	Currently unmarried	52.9	41.5	
Location	Urban	61.7	60.8	0.740
	Rural	38.4	39.2	
Education	None	5.3	10.9	<0.001
	Grade 1-7	16.1	27.6	
	Grade 8-11	36.1	33.2	
	Matric	26.3	15.7	
	Matric+	16.2	12.6	
Employment status	Currently employed	32.1	28.7	0.086
	Currently unemployed	67.9	71.4	
Family Income	None	13.5	14.5	0.092
	R1-5000	28.5	33.4	
	R5001-25 000	15.8	14.4	
	R25 001 -100 000	20.0	18.1	
	R100 000+	22.4	19.6	
Asset Index	None-5	38.0	41.9	0.043
	6-12	37.4	38.0	
	13-17	24.5	20.2	
Socioeconomic status	Low	26.4	41.0	<0.001
	Moderate	35.1	28.4	
	High	38.5	30.6	
Arthritis/rheumatism		4.4	26.1	<0.001
Other chronic pain		28.0	63.7	<0.001
Other medical conditions		30.7	65.1	<0.001
Traumatic life events	None	30.2	16.6	<0.001
	1-2	49.5	51.3	
	3-4	9.5	14.2	
	>5	10.8	17.9	
Life threatening accident	Ever	12.1	15.4	0.009
	Motor vehicle accident	9.3	12.3	0.011
	Other accident	2.8	3.1	0.533
Beaten badly	Ever	12.1	13.6	0.275
	As child, by caregivers	5.5	5.6	0.940
	By spouse	3.0	5.4	<0.001
	By other	3.6	2.7	0.262

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IV.1.2.2 Mental disorders

Table 5 describes the sociodemographic characteristics of those with any anxiety disorder, major depressive disorder or alcohol-related disorders. Mental disorders were more common among the younger population, particularly in alcohol-related disorders, where 45.9% were 18 - 29 years old ($p = 0.076$). Anxiety disorders and major depressive disorder were predominant in females (70.6%; $p < 0.001$ and 71.2%; $p < 0.001$ respectively) in contrast to alcohol-related disorders, which predominated in males (76.5%; $p < 0.001$). All the mental disorders were associated with a lower education level. Anxiety disorders and alcohol-related disorders were more common in those who were currently unemployed (74.9%, $p = 0.030$; 58.4%, $p < 0.001$ respectively). While the same pattern existed for major depressive disorder, the difference was not statistically significant (69.4%, $p = 0.923$). As far as traumatic life events were concerned, a larger proportion of those with mental disorders had been exposed to more than two traumatic life events than those without mental disorders. Just over twenty percent of those with alcohol-related disorders reported having ever been in a life-threatening accident ($p = 0.003$), with motor vehicle accidents constituting 15.9% ($p = 0.026$) alcohol-related. Interestingly, 6.9% of those with major depressive disorder reported being beaten badly by their spouse ($p = 0.003$), while only 1.1% reported being beaten badly by someone else ($p = 0.026$), compared with 3.5% respectively for those without major depressive disorder.

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Table 5: Description of sample prevalence stratified by 12-month mental disorders

Demographic characteristics	Categories	Any anxiety disorder*		Major depressive disorder*		Alcohol-related disorders*	
		%	p-value	%	p-value	%	p-value
Age in years	18-29	33.3	0.231	31.9	0.321	45.9	0.076
	30-39	22.9		23.8		14.6	
	40-49	22.3		22.5		23.8	
	50-59	13.0		13.8		12.3	
	60+	8.6		8.0		3.5	
Sex	Female	70.6	<0.001	71.2	<0.001	23.5	<0.001
	Male	29.4		28.8		76.5	
Race	Black	78.6	0.317	72.5	0.154	74.3	0.041
	Coloured	12.7		13.3		13.6	
	White	6.4		7.0		11.9	
	Asian/Indian	2.3		7.3		0.2	
Marital Status	Currently married	47.9	0.389	52.5	0.427	43.5	0.181
	Currently unmarried	52.1		47.5		56.5	
Location	Urban	66.3	0.122	64.9	0.392	63.7	0.612
	Rural	33.7		35.1		36.3	
Education	None	6.6	0.324	3.3	<0.001	5.3	0.011
	Grade1-7	22.5		32.6		12.2	
	Grade 8-11	37.9		36.1		41.3	
	Matric	20.3		13.9		19.2	
	Matric+	12.7		14.1		22.1	
Employment status	Currently employed	25.1	0.030	30.6	0.923	41.6	0.001
	Currently unemployed	74.9		69.4		58.4	
Family Income	None	11.9	0.163	18.1	0.276	14.4	0.386
	R1 - 5 000	32.2		28.6		23.9	
	R5001 - 25 000	13.0		11.0		20.1	
	R25 001 – 100 000	24.2		17.0		19.2	
	R100 000+	18.8		25.3		22.5	
Asset Index	None-5	39.7	0.201	36.3	0.614	32.4	0.134
	6-12	41.3		41.2		44.4	
	13-17	19.0		22.5		23.3	
Socioeconomic status	Low	35.1	0.329	31.9	0.857	26.4	0.420
	Moderate	31.0		31.4		33.4	
	High	34.0		36.7		40.2	
Traumatic life events	None	16.5	<0.001	10.0	<0.001	10.5	<0.001
	1-2	45.6		51.1		61.1	
	3-4	13.2		15.4		9.4	
	>5	24.7		23.6		19.0	
Life threatening accident	Ever	14.5	0.378	12.7	0.946	20.7	0.006
	Motor vehicle accident	10.0	0.980	10.0	0.997	15.9	0.026
	Other accident	4.5	0.123	2.7	0.860	4.8	0.134
Beaten badly	Ever	14.8	0.254	13.8	0.480	16.0	0.090
	As child, by caregivers	7.2	0.195	6.0	0.793	6.4	0.590
	By spouse	5.1	0.116	6.9	0.003	4.4	0.554
	By other	2.2	0.308	1.1	0.026	5.3	0.076

*Any anxiety disorder compared to no anxiety disorder; MDD compared to no MDD; alcohol-related disorders compared to no alcohol-related disorders

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IV.1.3 Relationship between chronic pain conditions and mental disorders

Table 6 presents the prevalence of 12-month mental disorders among those with and without chronic pain conditions. In both cases, the prevalence of mental disorders was higher among those with chronic pain conditions than those without chronic pain conditions. Among those with arthritis/rheumatism, 14.5% had an anxiety disorder, compared to only 7.7% of those without arthritis/rheumatism ($p < 0.001$). Of the anxiety disorders, those with arthritis/rheumatism had a higher proportion of social phobia ($p = 0.016$), agoraphobia ($p = 0.011$), and GAD ($p = 0.046$) compared to those without arthritis/rheumatism. The highest prevalence of any specific mental disorder in those with arthritis/rheumatism was major depressive disorder (MDD) (7.6%). In those without arthritis/rheumatism, the highest prevalence was alcohol-related disorders (5.0%).

A larger proportion (12.9%) of those with chronic back/neck pain had an anxiety disorder compared to those without chronic back/neck pain (6.8%, $p < 0.001$). As far as specific 12-month mental disorders were concerned, each anxiety disorder was more common among those with chronic back/neck pain than in those without. Once again, MDD (8.4%) was the most prevalent specific mental disorder among those with chronic back/neck pain, whereas agoraphobia (4.4%) was most common in those without chronic back/neck pain.

Overall, MDD and any anxiety disorder were more common among those with arthritis/rheumatism or chronic back/neck pain than among those without, in contrast to alcohol-related disorders, which was more prevalent among those without a chronic pain condition.

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Table 6: Prevalence of 12-month mental disorders stratified by chronic pain conditions

Mental disorders	No arthritis/ rheumatism	Arthritis/ rheumatism	p-value	No chronic back/neck pain	Chronic back/neck pain	p-value
	%	%		%	%	
Any anxiety disorder	7.7	14.5	<0.001	6.8	12.9	<0.001
Panic disorder	0.7	1.6	0.089	0.5	1.7	<0.001
Social phobia	1.7	3.8	0.016	1.6	2.7	0.082
Agoraphobia	4.6	6.9	0.011	4.4	6.0	0.021
PTSD	0.6	0.5	0.780	0.3	1.3	0.001
GAD	1.8	3.6	0.046	1.2	3.9	<0.001
Major depressive disorder	4.5	7.6	0.015	3.6	8.4	<0.001
Alcohol-related disorders	5.0	3.5	0.281	5.3	3.9	0.108

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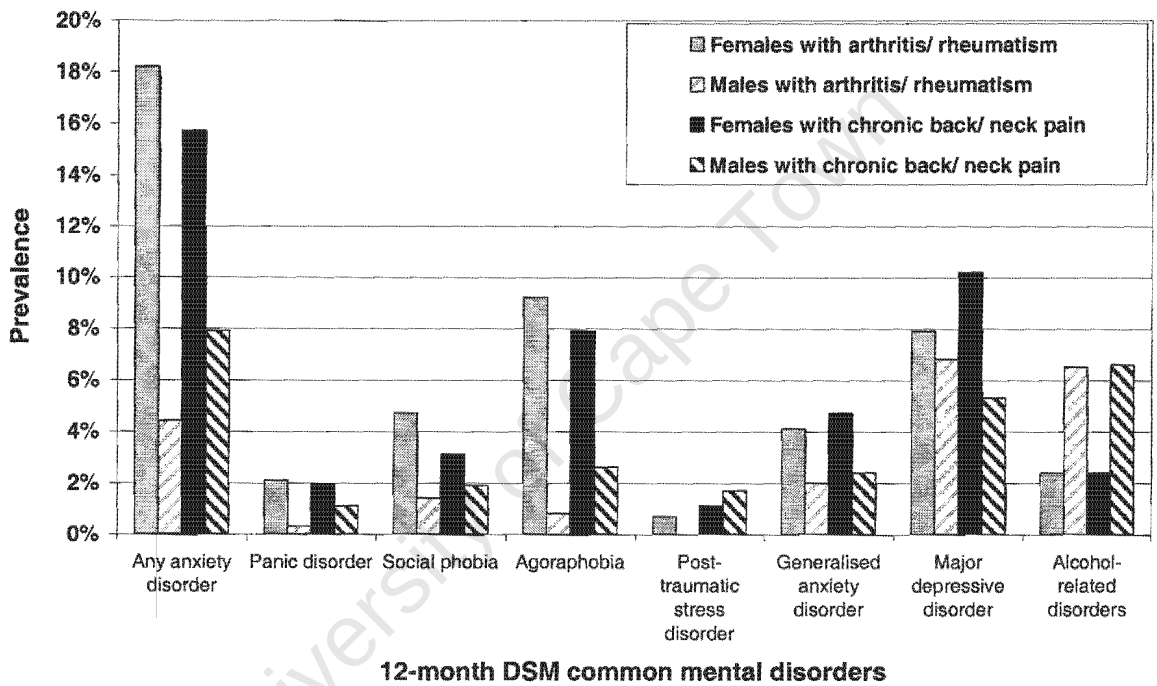
IV.1.3.1 Stratified by sex

Table 7 (following Figure 8) describes the prevalence of common 12-month mental disorders stratified by chronic pain conditions in women. In all cases except alcohol-related disorders, the prevalence of mental disorders was greater in women than in men. Females with chronic pain conditions had a higher proportion of each anxiety disorder and MDD compared to females without chronic pain conditions. This increase was only statistically significant in the cases of social phobia ($p = 0.020$) and agoraphobia ($p = 0.021$) among females with arthritis/rheumatism; yet in females with chronic back/neck pain, panic disorder ($p = 0.007$), PTSD ($p = 0.040$), GAD ($p < 0.001$) and MDD ($p < 0.001$) were all more common. Interestingly, women with chronic pain conditions had a higher proportion of alcohol-related disorders than women without chronic pain conditions (p-value > 0.050 for arthritis/rheumatism and chronic back/neck pain).

Table 8 (following Table 7) describes the prevalence of common 12-month mental disorders stratified by chronic pain conditions in men. This reveals somewhat different patterns than were observed among women. In males with arthritis/rheumatism, anxiety disorders and alcohol-related disorders were less common than in males without arthritis/rheumatism, although the estimates were imprecise. Men with arthritis/rheumatism, however, had a higher proportion of major depressive disorder than men without arthritis/rheumatism

(p = 0.043). The opposite is true for men with chronic back/neck pain, where all anxiety disorders (except agoraphobia) and major depressive disorder were more common compared with men without chronic back/neck problems. In contrast to women, men with chronic pain conditions had a smaller proportion of alcohol-related disorders compared with men without chronic pain conditions, although again the estimate was imprecise. Figure 8 below presents these differences between men and women.

Figure 8: Prevalence of 12-month mental disorders in chronic pain conditions for men and women



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Table 7: Prevalence of 12-month mental disorders stratified by arthritis/rheumatism and chronic back/neck pain in females only

Mental disorders	Total	No arthritis/ rheumatism	Arthritis/ rheumatism	p-value	No chronic back/neck pain	Chronic back/neck pain	p-value
	%	%	%		%	%	
Any anxiety disorder	10.9	9.8	18.2	<0.001	8.8	15.7	<0.001
Panic disorder	1.0	0.8	2.1	0.079	0.6	2.0	0.007
Social phobia	2.4	2.1	4.7	0.020	2.2	3.1	0.229
Agoraphobia	6.4	6.0	9.2	0.021	5.8	7.9	0.067
PTSD	0.6	0.6	0.7	0.843	0.4	1.1	0.040
GAD	2.4	0.2	4.1	0.113	1.5	4.7	<0.001
Major depressive disorder	6.4	6.1	7.9	0.281	4.7	10.2	<0.001
Alcohol-related disorders	2.2	2.1	2.4	0.712	2.0	2.4	0.565

Table 8: Prevalence of 12-month mental disorders stratified by arthritis/rheumatism and chronic back/neck pain in males only

Mental disorders	Total	No arthritis/ rheumatism	Arthritis/ rheumatism	p-value	No chronic back/neck pain	Chronic back/neck pain	p-value
	%	%	%		%	%	
Any anxiety disorder	5.3	5.4	4.4	0.698	4.7	7.9	0.048
Panic disorder	0.5	0.5	0.3	0.523	0.3	1.1	0.053
Social phobia	1.2	1.3	1.4	0.935	1.1	1.9	0.325
Agoraphobia	2.9	3.0	0.8	0.171	2.9	2.6	0.731
PTSD	0.6	0.6	0.0	0.523	0.3	1.7	0.002
GAD	1.3	1.3	2.0	0.542	1.0	2.4	0.099
Major depressive disorder	3.0	2.8	6.8	0.043	2.4	5.3	0.021
Alcohol-related disorders	8.1	8.1	6.5	0.621	8.6	6.6	0.224

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IV.2 UNADJUSTED ANALYSES

Table 9 shows the crude associations between chronic pain conditions and mental disorders. Those with arthritis/rheumatism had the strongest associations with anxiety disorders. Although panic disorder demonstrated the single strongest association with arthritis/rheumatism (OR = 2.39), the estimate was imprecise (95% CI: 0.85 - 6.77). A strong association also existed between social disorder and arthritis/rheumatism (OR = 2.34, 95% CI: 1.16 - 4.71), and between GAD and arthritis/rheumatism (OR = 2.07; 95% CI: 1.00 - 4.27). Additionally, major depressive disorder was significantly associated with arthritis/rheumatism (OR = 1.75; 95% CI: 1.11 - 2.75).

Those with chronic back/neck pain had the strongest association with PTSD (OR = 4.28; 95% CI: 1.82 - 10.08), followed by panic disorder (OR = 3.52; 95% CI: 1.85 - 6.70), generalised anxiety disorder (OR = 3.18; 95% CI: 1.8 - 3.75) and major depressive disorder (OR = 2.50; 95% CI: 1.66 - 3.75). It is worth noting, however, that the association between any anxiety disorder and chronic back/neck pain was weaker than the association between major depressive disorder and chronic back/neck pain.

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Table 9: Crude association between chronic pain conditions and mental health

Mental disorders	**Arthritis/rheumatism**		**Chronic back/neck pain**	
	OR	95% CI	OR	95% CI
Any anxiety disorder	2.04	1.48-2.80	2.04	1.54-2.71
Panic disorder	2.39	0.85-6.77	3.52	1.85-6.70
Social phobia	2.34	1.16-4.71	1.66	0.93-2.96
Agoraphobia	1.55	1.11-2.18	1.38	1.05-1.82
PTSD	0.83	0.21-3.18	4.28	1.82-10.08
GAD	2.07	1.00-4.27	3.18	1.68-6.02
Major depressive disorder	1.75	1.11-2.76	2.50	1.66-3.75
Alcohol-related disorders	0.69	0.35-1.37	0.73	0.50-1.07

IV.2.1 Stratified by sex

Tables 10 and 11 show the sex-stratified crude associations between mental disorders and arthritis/rheumatism and chronic back/neck pain, respectively. The strongest crude association with arthritis/rheumatism in females was with social phobia (OR = 2.35; 95% CI: 1.13 - 4.91), followed by agoraphobia (OR = 1.57; 95% CI: 1.07 - 2.30). While any anxiety disorder demonstrated a stronger association (OR = 2.04; 95% CI: 1.41 - 2.95) than major depressive disorder and alcohol-related disorders, the latter two were not statistically significant (see Table 10). All other associations between mental disorders and arthritis/rheumatism in women were not statistically significant. In contrast, among men, only major depressive disorder had a significant association with arthritis/rheumatism (OR = 2.55; 95% CI: 1.00 - 6.51).

Among women with chronic back/neck pain, GAD was most strongly associated (OR = 3.30; 95% CI: 1.83 - 5.96), followed by panic disorder (OR = 3.19; 95% CI: 1.34 - 7.60), PTSD (OR = 2.94: 95% CI: 1.00 - 8.66) and major depressive disorder (OR = 2.32; 95% CI: 1.47 - 3.66) (see Table 11). Alcohol-related disorders showed no association with chronic back/neck pain among females. Men with chronic back/neck pain were highly associated with PTSD (OR = 7.02; 95% CI: 1.78 - 27.62), and also strongly associated with major depressive disorder (OR = 2.23; 95% CI: 1.12 - 4.46), but showed no association with alcohol-related disorders.

In summary, anxiety disorders and major depressive disorder were more strongly associated with chronic pain conditions among women; yet in men the predominant association with chronic pain conditions involved depression, with few associations involving anxiety disorders, except for PTSD and panic disorder, which had a strong association with chronic back/neck pain.

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Table 10: Crude association between arthritis/rheumatism and 12-month mental disorders stratified by sex

Mental disorders	Arthritis/rheumatism in females		Arthritis/rheumatism in males	
	OR	95% CI	OR	95% CI
Any anxiety disorder	2.04	1.41-2.95	0.81	0.28-2.36
Panic disorder	2.54	0.86-7.46	0.53	0.07-3.89
Social phobia	2.35	1.13-4.91	1.09	0.14-8.70
Agoraphobia	1.57	1.07-2.30	0.26	0.03-2.08
PTSD	1.13	0.33-3.91	-	-
GAD	1.91	0.84-4.35	1.57	0.36-6.85
Major depressive disorder	1.32	0.79-2.21	2.55	1.00-6.51
Alcohol-related disorders	1.18	0.48-2.94	0.78	0.29-2.11

Table 11: Crude association between chronic back/neck pain and 12-month mental disorders stratified by sex

Mental disorders	Chronic back/neck pain in females		Chronic back/neck pain in males	
	OR	95% CI	OR	95% CI
Any anxiety disorder	1.93	1.41-2.63	1.75	1.00-3.06
Panic disorder	3.19	1.34-7.60	3.41	0.91-12.74
Social phobia	1.45	0.78-2.68	1.75	0.56-5.52
Agoraphobia	1.38	0.98-1.95	0.89	0.44-1.78
PTSD	2.94	1.00-8.66	7.02	1.78-27.62
GAD	3.30	1.83-5.96	2.39	0.82-7.00
Major depressive disorder	2.32	1.47-3.66	2.23	1.12-4.46
Alcohol-related disorders	1.19	0.65-2.17	0.76	0.49-1.19

Figure 9 (below) presents the differences between men and women with arthritis/rheumatism and the crude association with 12-month mental disorders. Figure 10 (following Figure 9) presents the differences between men and women with chronic back/neck pain and the crude association with 12-month mental disorders.

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Figure 9: Crude association between arthritis/rheumatism and 12-month mental disorders in men and women

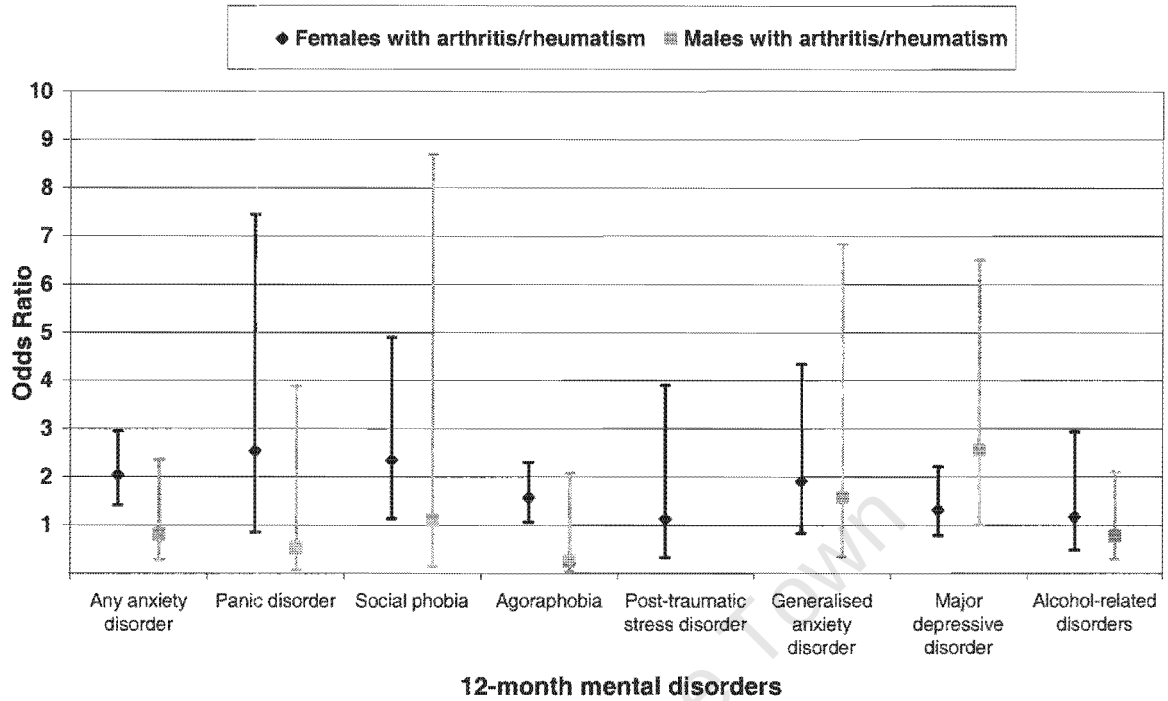
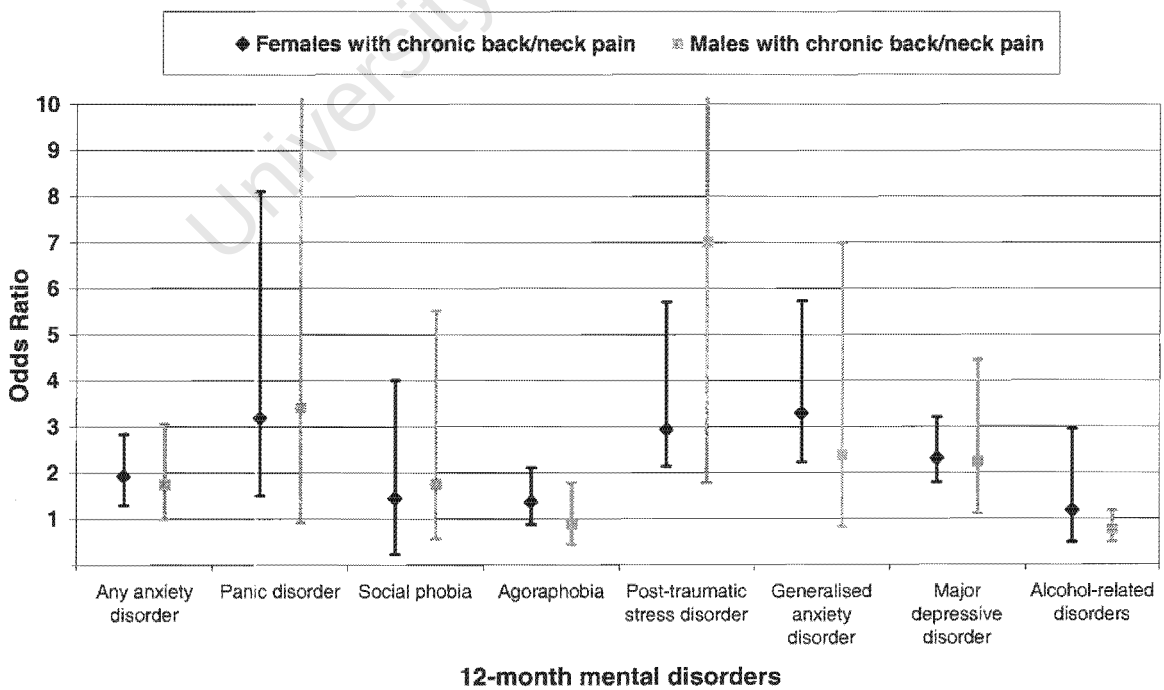


Figure 10: Crude association between chronic back/neck pain and 12-month mental disorders in men and women



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IV.3 MULTIVARIATE ANALYSES

This section describes the results of all the multivariate analyses conducted. It is broken down into sub-sections on adjusted associations, independent predictors of chronic pain, and sex as an effect modifier.

IV.3.1 Adjusted associations

Adjusted associations between arthritis/rheumatism and mental disorders were analysed first, followed by an analysis of the adjusted association between chronic back/neck pain and mental disorders.

IV.3.1.1 Arthritis/rheumatism and mental disorders

Table 12, presented on the following page, shows the adjusted association between arthritis/rheumatism and mental disorders. When adjusting for sociodemographic characteristics such as age, race, location, marriage, sex and socioeconomic status, as well as other medical conditions, other chronic pain (including chronic back/neck pain) and traumatic life events, the only remaining association was between social phobia and arthritis/rheumatism (OR = 2.29; 95% CI: 1.04 - 5.04). The association between GAD and arthritis/rheumatism moved towards the null after adjusting for sociodemographics and other medical conditions; and the association involving MDD and arthritis/rheumatism moved towards the null after adjusting for socioeconomics, other medical conditions and other chronic pain. Overall, a weak and imprecise association persisted among any anxiety disorder and arthritis/rheumatism (OR = 1.22; 95% CI: 0.85 - 1.76) and between any mental disorder and arthritis/rheumatism (OR = 1.21; 95% CI: 0.84 - 1.73).

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IV.3.1.2 Chronic back/neck pain and mental disorders

Table 13 (following Table 12), shows the adjusted association between chronic back/neck pain and mental disorders. After adjusting for all sociodemographic characteristics, other chronic pain (including arthritis/rheumatism), other medical conditions and traumatic life events, major depressive disorder (OR = 1.61; 95% CI: 1.09 - 2.38) and PTSD (OR = 3.22; 95% CI: 1.18 - 8.76) remained statistically significant associations with chronic back/neck pain. Panic disorder (OR = 2.49; 95% CI: 1.09 - 5.68) and GAD (OR = 2.11; 95% CI: 1.07 -

4.17) persisted in their association with chronic back/neck pain when adjusted for sociodemographic characteristics and other medical conditions, but the estimate became less precise once adjusted for other chronic pain. Social phobia was associated with chronic neck/back pain (OR = 1.75; 95% CI: 1.01 - 3.03) when adjusted for sociodemographic variables, but moved towards the null and loses precision when adjusted for other medical conditions and other chronic pain. Overall, those with chronic back/neck pain had a 1.32 times increased odds of having any mental disorder (i.e. major depression, any anxiety disorder or alcohol-related disorders).

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Table 12: Adjusted association between arthritis/rheumatism and mental disorders

Arthritis/rheumatism (n = 4 311)														
Mental Disorders	**Crude association**		**A: Adjusted for age, race, location & marriage**		**B: Adjusted for A and sex**		**C: Adjusted for B and SES tertiles**		**D: Adjusted for C and other medical conditions**		**E: Adjusted for D and other chronic pain (including chronic back/neck pain)**		**F: Adjusted for E and traumatic life events**	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Any anxiety disorder	2.04	1.48-2.80	2.07	1.44-2.98	1.79	1.25-2.55	1.75	1.24-2.48	1.51	1.05-2.17	1.26	0.89-1.78	1.22	0.85-1.76
Panic disorder	2.39	0.85-6.78	1.92	0.57-6.49	1.72	0.53-5.55	1.66	0.49-5.69	1.36	0.41-4.53	1.01	0.27-3.69	0.95	0.25-3.58
Agoraphobia	1.55	1.11-2.18	1.75	1.17-2.64	1.48	1.01-2.19	1.47	0.98-2.22	1.29	0.84-1.99	1.20	0.78-1.84	1.17	0.75-1.82
Social phobia	2.34	1.16-4.71	3.20	1.46-7.02	2.82	1.31-6.06	3.08	1.44-6.60	2.74	1.34-5.58	2.32	1.13-4.78	2.29	1.04-5.04
PTSD	0.83	0.22-3.18	0.69	0.19-2.54	0.67	0.20-2.27	0.62	0.19-2.02	0.49	0.15-1.61	0.33	0.10-1.11	*	
GAD	2.07	1.00-4.27	1.60	0.70-3.63	1.42	0.64-3.15	1.34	0.59-3.05	1.08	0.48-2.42	0.80	0.37-1.75	0.79	0.36-1.74
Major depressive disorder	1.75	1.11-2.76	1.73	1.07-2.79	1.50	0.91-2.45	1.48	0.91-2.43	1.26	0.78-2.03	0.99	0.62-1.57	0.95	0.59-1.54
Alcohol-related disorders	0.69	0.35-1.37	0.80	0.39-1.65	1.12	0.52-2.42	1.12	0.51-2.45	1.05	0.47-2.37	1.10	0.47-2.60	1.10	0.46-2.64
Any mental disorder	1.65	1.25-2.19	1.76	1.26-2.46	1.72	1.22-2.44	1.69	1.20-2.38	1.47	1.04-2.08	1.24	0.88-1.75	1.21	0.84-1.73

In each case the comparison group was those without the outcome of interest.

* PTSD is defined in part by traumatic life events; therefore any association between PTSD and traumatic life events is spurious

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Table 13: Adjusted association between chronic back/neck pain and mental disorders

Chronic back/neck pain (n = 4 321)														
Mental Disorders	**Crude association**		**A: Adjusted for age, race, location & marriage**		**B: Adjusted for A and sex**		**C: Adjusted for B and SES tertiles**		**D: Adjusted for C and other medical conditions**		**E: Adjusted for D and other chronic pain (including arthritis/ rheumatism)**		**F: Adjusted for E and traumatic life events**	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Any anxiety disorder	2.04	1.54-2.71	1.99	1.50-2.66	1.83	1.36-2.46	1.80	1.33-2.44	1.58	1.17-2.14	1.27	0.94-1.71	1.21	0.89-1.64
Panic disorder	3.52	1.85-6.70	3.18	1.71-5.92	2.96	1.55-5.67	2.96	1.54-5.70	2.49	1.09-5.68	1.90	0.72-4.97	1.76	0.66-4.72
Agoraphobia	1.38	1.05-1.82	1.41	1.04-1.91	1.27	0.95-1.71	1.26	0.93-1.71	1.11	0.81-1.51	0.91	0.65-1.29	0.88	0.63-1.24
Social phobia	1.66	0.93-2.95	1.85	1.07-3.18	1.71	0.99-2.97	1.75	1.01-3.03	1.54	0.85-2.79	1.04	0.53-2.04	1.00	0.49-2.03
PTSD	4.28	1.82-10.01	4.42	1.86-10.51	4.46	1.79-11.10	4.32	1.67-11.14	3.56	1.19-10.64	3.22	1.18-8.76	*	
GAD	3.18	1.68-6.02	2.84	1.49-5.42	2.70	1.42-5.14	2.62	1.34-5.11	2.11	1.07-4.17	1.83	0.97-3.43	1.72	0.88-3.35
Major depressive disorder	2.50	1.66-3.75	2.44	1.61-3.68	2.25	1.49-3.42	2.25	1.48-3.41	1.97	1.31-2.95	1.73	1.18-2.55	1.61	1.09-2.38
Alcohol-related disorders	0.73	0.50-1.07	0.79	0.55-1.13	0.95	0.67-1.36	0.95	0.67-1.36	0.89	0.61-1.30	0.91	0.58-1.42	0.85	0.55-1.31
Any mental disorder	1.79	1.42-2.25	1.81	1.41-2.31	1.79	1.40-2.30	1.77	1.38-2.28	1.57	1.23-2.02	1.37	1.05-1.78	1.29	0.99-1.68

In each case the comparison group was those without the outcome of interest.

* PTSD is defined in part by traumatic life events, therefore any association between PTSD and traumatic life events is spurious

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IV.3.1.3 Summary

A summary of the final adjusted associations for chronic pain conditions and mental disorders is displayed in table 14.

Table 14: Summary table of adjusted (column F) association between chronic pain conditions and mental disorders

Mental disorders	Arthritis/rheumatism^		Chronic back/neck pain^	
	OR	95% CI	OR	95% CI
Any anxiety disorder	1.22	0.85-1.76	1.21	0.89-1.64
Panic disorder	0.95	0.25-3.58	1.76	0.66-4.72
Agoraphobia	1.17	0.75-1.82	0.88	0.63-1.24
Social phobia	2.29	1.04-5.04	1.00	0.49-2.03
PTSD	0.33*	0.10-1.11	3.22*	1.18-8.76
GAD	0.79	0.36-1.74	1.72	0.88-3.35
Major depressive disorder	0.95	0.59-1.54	1.61	1.09-2.38
Alcohol-related disorders	1.10	0.46-2.64	0.85	0.55-1.31
Any mental disorder	1.21	0.84-1.73	1.29	0.99-1.68

In each case the comparison group was those without the outcome of interest
Adjusted for sociodemographic variables, other medical conditions, other chronic pain and traumatic life events.
^ Those with arthritis/rheumatism were also adjusted for chronic back/neck pain; and those with chronic back/neck pain were also adjusted for arthritis/rheumatism
* PTSD is defined in part by traumatic life events, therefore any association between PTSD and traumatic life events is spurious; as such PTSD was not adjusted for traumatic life events in this summary table

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A. Confounders

From the logistic regression analyses, it appears that there were only partial confounders to the relationship between chronic pain conditions and mental health. Although the confounders vary slightly between the associations between chronic pain conditions and specific 12-month mental disorders, the predominant partial confounders to the associations were sex, age, SES (particularly education level attained), other chronic pain, other medical conditions and traumatic life events.

B. Stratified by sex

Tables 15 and 16 indicate the adjusted association between chronic pain conditions and mental disorders in women and men respectively. Overall, females with arthritis/rheumatism were 1.6 times more likely to have any anxiety disorder (95% CI: 1.10 - 2.42) and 1.4 times more likely to have any mental disorder (95% CI: 0.98 - 2.01) than females without arthritis/rheumatism (see Table 15). After adjustment for sociodemographic variables, other chronic pain, other medical conditions and traumatic life events, social phobia was associated with women with arthritis/rheumatism (OR = 2.55; 95% CI: 1.12 - 5.79), while agoraphobia had a weak and imprecise association with women with arthritis/rheumatism (OR = 1.49; 95% CI: 0.89 - 2.48). Among women with chronic back/neck pain, after adjusting for the abovementioned variables, there was a two-fold increased odds of having GAD (95% CI: 1.14 - 3.49) and a 1.6 times increased odds of having MDD (95% CI: 1.01 - 2.58). An association also existed between women with chronic back/neck pain and PTSD (OR = 2.58), however the estimate was imprecise (95% CI: 0.73 - 9.08). Overall, women with chronic back/neck pain were 1.4 times more likely to have any anxiety disorder (95% CI: 1.00 - 1.81) and 1.5 times more likely to have any mental disorder (95% CI: 1.10 - 1.92) than women without chronic back/neck pain (see Table 15).

After adjusting for sociodemographic variables, other chronic pain, other medical conditions and traumatic life events, men with arthritis/rheumatism had increased odds of social phobia and MDD; however in both instances the estimates were imprecise (see Table 16). Among men with chronic back/neck pain, after adjusting for the above variables, there was nearly a three-fold increase in the odds of panic disorder (95% CI: 1.04-7.67) and a greater than four-fold increased odds of PTSD (95% CI: 0.98-20.27) compared with men without chronic back/neck pain. Associations between chronic back/neck pain and social phobia, as well as between chronic back/neck pain and MDD, existed in men, however in both cases the confidence intervals were wide (see Table 16).

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Table 15: Adjusted association between chronic pain conditions and mental health in females

Mental disorders	Arthritis/rheumatism^		Chronic back/neck pain^	
	OR	95% CI	OR	95% CI
Any anxiety disorder	1.54	1.04-2.27	1.25	0.93-1.68
Panic disorder	1.12	0.26-4.80	1.44	0.41-5.05
Agoraphobia	1.49	0.89-2.48	0.98	0.66-1.45
Social phobia	2.55	1.12-5.79	0.82	0.39-1.72
PTSD	0.50*	0.15-1.68	2.58*	0.73-9.08
GAD	0.86	0.39-1.90	2.06	1.20-3.56
Major depressive disorder	0.81	0.48-1.39	1.64	1.04-2.60
Alcohol-related disorders	1.14	0.39-3.30	0.83	0.43-1.61
Any mental disorder	1.29	0.89-1.86	1.39	1.05-1.85

In each case the comparison group was those without the outcome of interest.
Adjusted for sociodemographics, all other chronic pain and medical conditions and traumatic life events.
^ Those with arthritis/rheumatism were also adjusted for chronic back/neck pain; and those with chronic back/neck pain were also adjusted for arthritis/rheumatism
* PTSD is defined in part by traumatic life events, therefore any association between PTSD and traumatic life events is spurious; as such PTSD was not adjusted for traumatic life events in this summary table)

Table 16: Adjusted association between chronic pain conditions and mental health in males

Mental disorders	Arthritis/rheumatism^		Chronic back/neck pain^	
	OR	95% CI	OR	95% CI
Any anxiety disorder	0.40	0.12-1.34	1.11	0.59-2.06
Panic disorder	0.30	0.03-3.22	2.79	1.09-7.13
Agoraphobia	0.18	0.02-1.36	0.64	0.31-1.35
Social phobia	2.16	0.21-22.04	1.55	0.37-6.45
PTSD	1.37*	0.25-7.65	4.61*	1.02-20.80
GAD	0.37	0.04-3.59	1.00	0.24-4.11
Major depressive disorder	1.67	0.60-4.70	1.53	0.73-3.21
Alcohol-related disorders	1.03	0.31-3.44	0.86	0.49-1.49
Any mental disorder	0.91	0.42-2.01	1.14	0.73-1.78

In each case the comparison group was those without the outcome of interest.
Adjusted for sociodemographics, all other chronic pain and medical conditions and traumatic life events.
^ Those with arthritis/rheumatism were also adjusted for chronic back/neck pain; and those with chronic back/neck pain were also adjusted for arthritis/rheumatism
* PTSD is defined in part by traumatic life events, therefore any association between PTSD and traumatic life events is spurious; as such PTSD was not adjusted for traumatic life events in this summary table

Figure 11 (below) presents the differences between women and men with arthritis/rheumatism and the adjusted association with common mental disorders. Figure 12 (following Figure 11) presents the differences between women and men with chronic back/neck pain and the adjusted association with common mental disorders.

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Figure 11: Adjusted association (model F) between arthritis/rheumatism and 12-month mental disorders

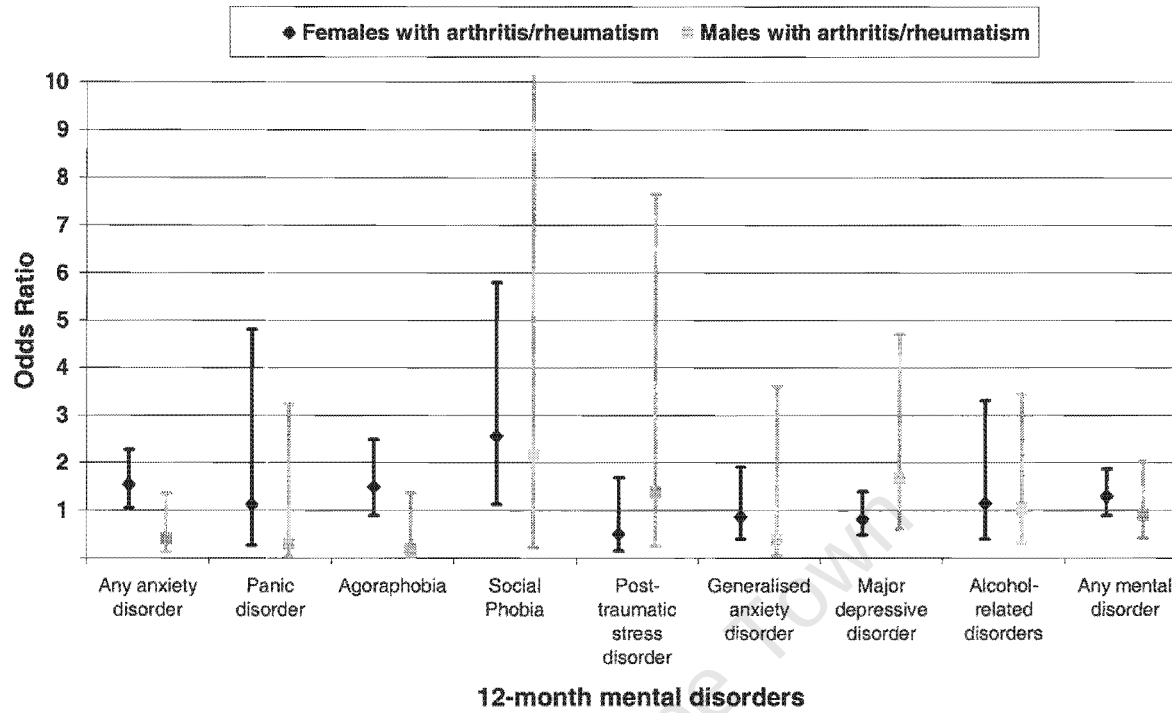
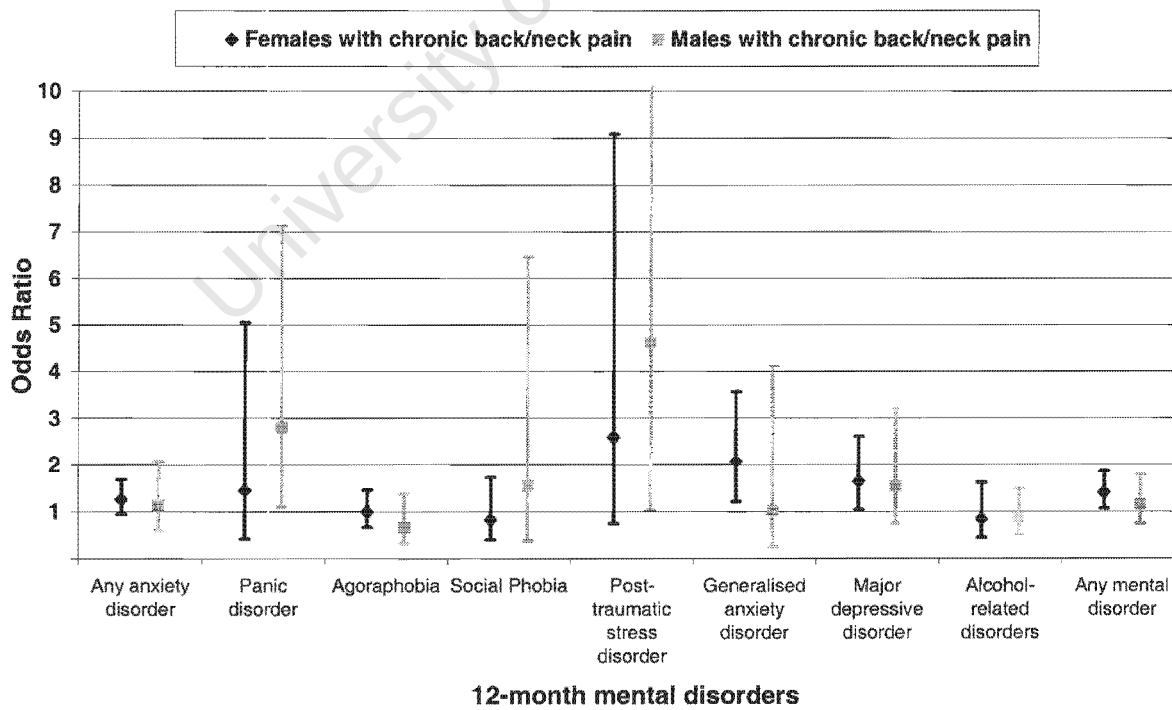


Figure 12: Adjusted association (model F) between chronic back/neck pain and 12-month mental disorders



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IV.3.2 Independent predictors of chronic pain conditions

This study determined the extent to which the following are independent predictors of arthritis/rheumatism and chronic back/neck pain: sociodemographics, traumatic life events, and physical traumas.

IV.3.2.1 Sociodemographics and traumatic life events

Table 17 shows the independent predictors of arthritis/rheumatism and chronic back/neck pain from model F above. Age was an independent predictor for both arthritis/rheumatism and chronic back/neck pain. In the case of arthritis/rheumatism, the effect of age followed a dose-response pattern: as age increased, the odds of arthritis/rheumatism increased considerably, to the point where the 60 years old and older age group had an 8.9 times increased odds of arthritis/rheumatism, compared with 18 to 29 year olds (95% CI: 5.04 - 15.82). This was also the case for chronic back/neck pain, although the dose-response increase was far less marked, with the 60 and over age group being 1.8 times more likely to have chronic back/neck pain than the 18 to 29 year olds (95% CI: 1.25 - 2.60). Females were 2.1 times more likely than males to have arthritis/rheumatism (95% CI: 1.42 - 3.04), but only 1.28 times more likely to have chronic back/neck pain (95% CI: 1.05 - 1.56). Race was not an independent risk factor for chronic back/neck pain, however Coloureds, Indians/Asians and Whites all had an increased odds of arthritis/rheumatism compared with Blacks (but these estimates were imprecise – see Table 17). No association existed between either of the chronic pain conditions and marital status. Individuals living in urban settings were 1.5 times more likely to have arthritis/rheumatism than individuals living in rural settings, yet no association existed between location and chronic back/neck pain. Higher levels of SES were protective against both arthritis/rheumatism and chronic back/neck pain, yet the protective effect was stronger in arthritis/rheumatism (see Table 17). While other chronic pain increased the odds of having arthritis/rheumatism by 1.8 times, it increased the odds of chronic back/neck pain by just over 3 times. The strongest risk factor for arthritis/rheumatism (besides age) was the presence of chronic back/neck pain (OR = 3.79), and the same was true for arthritis/rheumatism being the strongest predictor for chronic back/neck pain (OR = 3.12). The presence of other medical conditions was also an independent risk factor for both chronic pain conditions.

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Table 17: Independent predictors for arthritis/rheumatism vs. no arthritis/rheumatism and chronic back/neck pain vs. no chronic back/neck pain

Demographic characteristics	Categories	Arthritis/ rheumatism		Chronic back/ neck pain	
		OR	95% CI	OR	95% CI
Age categories	18-29	1.00	(reference)	1.00	(reference)
	30-39	1.91	1.23-2.97	1.28	0.99-1.66
	40-49	2.91	1.74-4.88	1.55	1.16-2.08
	50-59	6.44	3.90-10.64	1.67	1.17-2.38
	60+	8.93	5.04-15.82	1.80	1.25-2.60
Sex	Male	1.00	(reference)	1.00	(reference)
	Female	2.08	1.42-3.04	1.28	1.05-1.56
Race	Black	1.00	(reference)	1.00	(reference)
	Coloured	1.42	0.94-2.14	1.19	0.79-1.78
	White	2.00	0.90-4.46	0.79	0.57-1.08
	Indian/ Asian	1.67	0.89-3.14	1.40	0.82-2.40
Marital Status	Currently unmarried	1.00	(reference)	1.00	(reference)
	Currently married	1.08	0.77-1.50	1.11	0.89-1.39
Location	Rural	1.00	(reference)	1.00	(reference)
	Urban	1.43	1.05-1.94	1.13	0.90-1.41
Socioeconomic status	Low	1.00	(reference)	1.00	(reference)
	Moderate	0.55	0.34-0.89	0.65	0.52-0.80
	High	0.47	0.26-0.84	0.69	0.53-0.89
Arthritis/rheumatism		-	-	3.63	2.70-4.87
Chronic back/neck pain		3.79	2.83-5.09	-	-
Other chronic pain		1.75	1.35-2.27	3.12	2.52-3.86
Other medical conditions		2.47	1.74-3.50	2.17	1.78-2.63
Traumatic life events	None	1.00	(reference)	1.00	(reference)
	1-2	1.10	0.78-1.55	1.52	1.24-1.86
	3-4	0.95	0.61-1.48	1.79	1.33-2.40
	>5	1.46	0.89-2.40	1.82	1.32-2.50

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IV.3.2.2 Physical Traumas

Table 18 reports the association between traumatic life events, specifically physical traumas, and chronic pain conditions, after adjustment for sociodemographic variables, other medical conditions and other chronic pain. There was no association between physical traumas and arthritis/rheumatism, yet increased exposure to traumatic life events increased the odds of chronic back/neck pain. In the physical traumas examined in this study, participants who had been in a life threatening motor vehicle accident were 1.4 times more likely to have chronic back/neck pain than those who had never been in a life threatening motor vehicle accident (95% CI: 1.03 - 1.78); while those who had been beaten badly by their spouse were 1.4 times more likely to have chronic back/neck pain than those who were never beaten by a spouse

(95% CI: 0.97 - 1.92). Having been beaten badly as a child was also a weak and imprecise independent risk factor for chronic back/neck pain.

Table 18: Independent association of specific physical traumatic events and chronic pain conditions

Traumatic events	Categories	Arthritis/ rheumatism^		Chronic back/ neck pain^	
		OR	95% CI	OR	95% CI
Life threatening accident	Motor vehicle accident	1.18	0.77-1.80	1.35	1.03-1.78
	Other accident	1.25	0.58-2.70	0.96	0.54-1.70
Beaten badly	As child, by caregivers	0.98	0.43-2.21	1.24	0.84-1.84
	By spouse	1.25	0.76-2.05	1.37	0.97-1.92
	By other	0.57	0.20-1.57	0.91	0.53-1.57

Adjusted for sociodemographic variables, other chronic pain and other medical conditions.
^ Those with arthritis/rheumatism were also adjusted for chronic back/neck pain; and those with chronic back/neck pain were also adjusted for arthritis/rheumatism
In each case the comparison group was those without the outcome of interest

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A. Stratified by sex

Females with arthritis/rheumatism had a 1.8 times increased odds of having been involved in a motor vehicle accident compared with females without arthritis/rheumatism (95% CI: 1.06 - 2.94). In addition, they had slightly increased odds of having been involved in any other life-threatening accident, although the measure was imprecise (see Table 19). Women with chronic back/neck pain had a 1.5 times increased odds of having been beaten badly by a spouse than women without chronic back/neck pain; this estimate was precise.

Men with arthritis/rheumatism had a two-fold increased odds of having been beaten badly as a child, and a 1.8 times increased odds of having been beaten badly by a spouse; however in both cases the estimate was imprecise. Males with chronic back/neck pain had a 1.4 times increased odds of having ever been involved in a life-threatening motor vehicle accident, and a 1.3 times increased odds of having ever been beaten as a child, compared with males without chronic back/neck pain. These estimates were however consistent with the null (see Table 20).

Table 19: Independent association of specific physical traumatic events and chronic pain conditions in females only.

Traumatic events	Categories	Arthritis/ rheumatism^		Chronic back/ neck pain^	
		OR	95% CI	OR	95% CI
Life threatening accident	Motor vehicle accident	1.77	1.06-2.94	1.24	0.84-1.81
	Other accident	1.45	0.54-3.88	1.13	0.46-2.78
Beaten badly	As child, by caregivers	0.77	0.36-1.64	1.19	0.74-1.91
	By spouse	1.26	0.75-2.10	1.48	1.04-2.11
	By other	0.40	0.10-1.51	0.72	0.35-1.49

In each case the comparison group was those without the outcome of interest.
Adjusted for sociodemographic variables, other chronic pain and other medical conditions.
^ Those with arthritis/rheumatism were also adjusted for chronic back/neck pain; and those with chronic back/neck pain were also adjusted for arthritis/rheumatism

Table 20: Independent association of specific physical traumatic events and chronic pain conditions in males only.

Traumatic events	Categories	Arthritis/ rheumatism^		Chronic back/ neck pain^	
		OR	95% CI	OR	95% CI
Life threatening accident	Motor vehicle accident	0.32	0.11-0.92	1.44	0.89-2.33
	Other accident	0.95	0.23-3.90	0.82	0.37-1.84
Beaten badly	As child, by caregivers	2.02	0.37-10.93	1.30	0.71-2.36
	By spouse	1.77	0.38-8.18	0.23	0.04-1.33
	By other	0.66	0.15-2.99	1.08	0.52-2.27

In each case the comparison group was those without the outcome of interest.
Adjusted for sociodemographic variables, other chronic pain and other medical conditions.
^ Those with arthritis/rheumatism were also adjusted for chronic back/neck pain; and those with chronic back/neck pain were also adjusted for arthritis/rheumatism

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Figure 13 (below) presents the differences between men and women with arthritis/rheumatism and the adjusted association with physical traumas. Figure 14 (following Figure 13) presents the differences between men and women with chronic back/neck pain and the adjusted association with physical traumas.

Figure 13: Adjusted association between arthritis/rheumatism and physical traumas

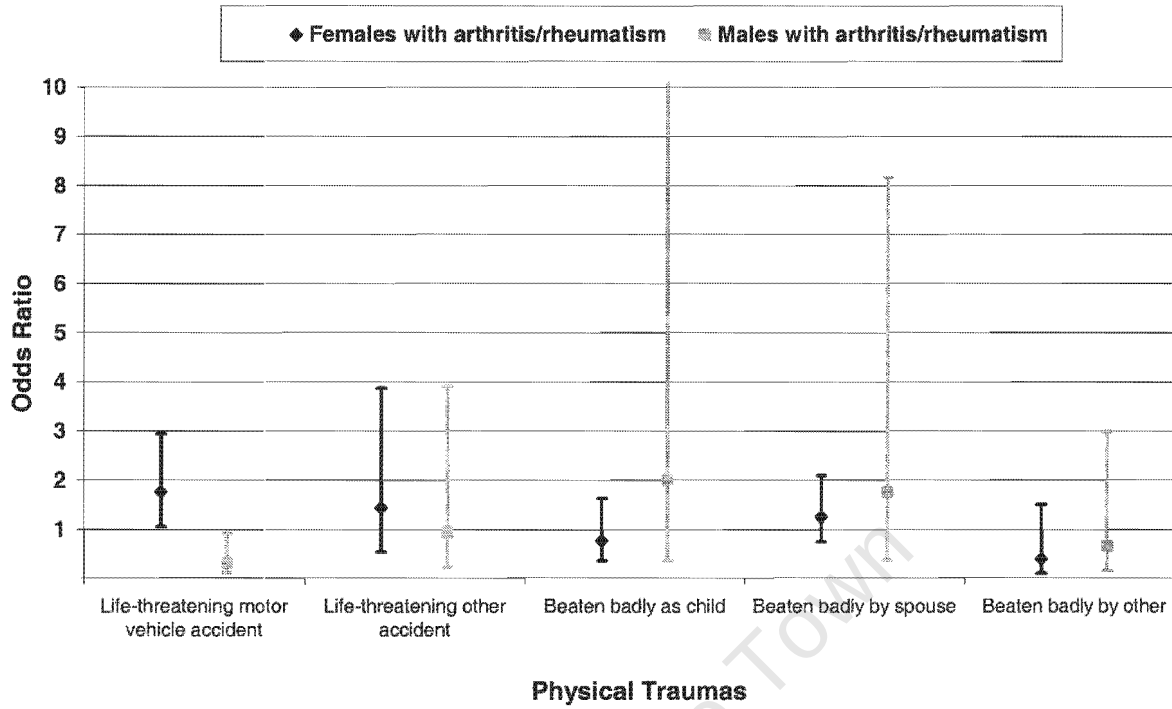
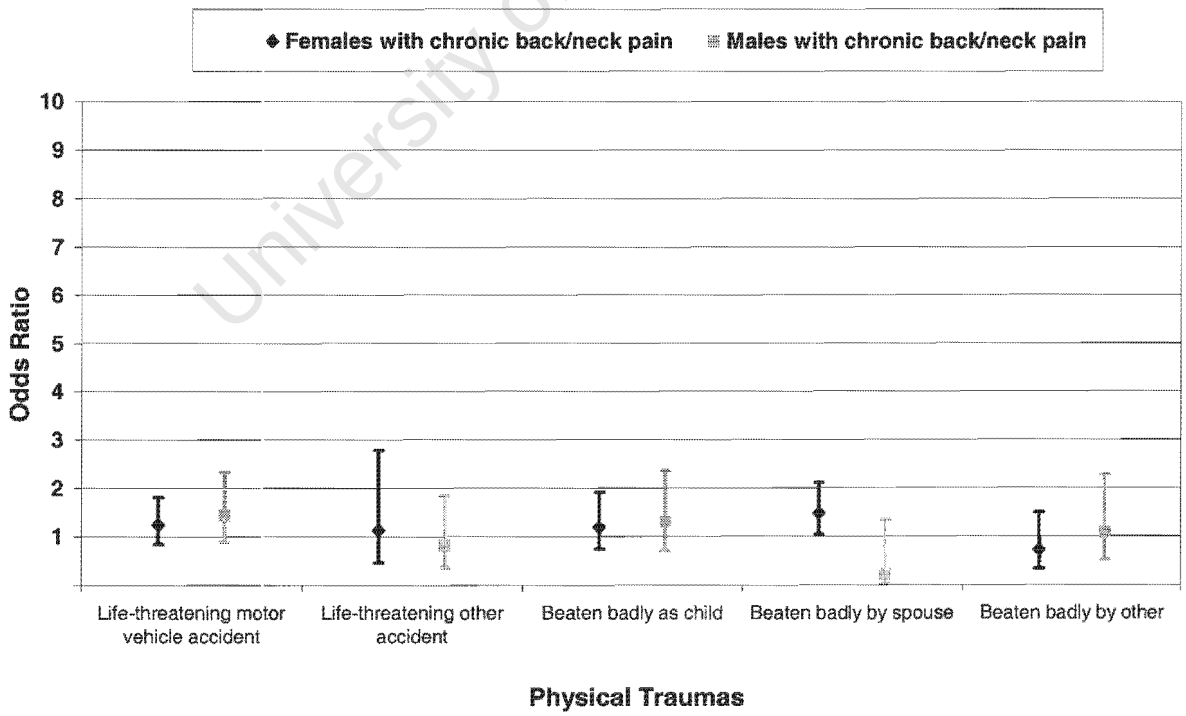


Figure 14: Adjusted association between chronic back/neck pain and physical traumas



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IV.3.3 Sex as an effect modifier

In the multiple logistic regression analysis to assess whether sex was an effect modifier in the association between chronic pain conditions and mental disorders, a cross-product term for male/female sex was entered into the crude association and model F for each type of disorder. Very little difference was found between the crude and adjusted associations (see Tables 21 and 22).

Overall, the association between chronic pain conditions and any mental disorder was generally stronger in women, with some notable exceptions. In all cases, the estimates were imprecise as reflected by wide confidence intervals for the interaction term between gender and chronic pain condition. The association between any anxiety disorder and arthritis/rheumatism was 2.5 times greater in women (95% CI: 0.78 - 8.12); but the association between any anxiety disorder and chronic back/neck pain was more or less equal between the sexes (OR = 1.10; 95% CI: 0.62 - 1.95). When broken down by individual anxiety disorders, the association between each individual anxiety disorder and arthritis/rheumatism was greater in women. In the case of chronic back/neck pain, only the associations with agoraphobia and GAD were greater in women. The associations for panic disorder and social phobia with chronic back/neck pain were approximately equal between men and women; however, the association between PTSD and chronic back/neck pain was notably stronger among men (OR = 0.42; 95% CI: 0.07 - 2.48).

The association between MDD and arthritis/rheumatism was greater in men (OR = 0.52; 95% CI: 0.18 - 1.49), but the association between MDD and chronic back/neck pain was approximately equal for men and women (OR = 1.04; 95% CI: 0.49 - 2.19). Interestingly, the association between alcohol-related disorders and both arthritis/rheumatism and chronic back/neck pain was greater in women.

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Table 21: Effect modification for the crude association between chronic pain conditions and mental disorders

Mental disorders	Arthritis/rheumatism			Chronic back/neck pain		
	OR	p-value	95% CI	OR	p-value	95% CI
Any anxiety disorder	2.51	0.121	0.78-8.12	1.10	0.734	0.62-1.95
Panic disorder	4.75	0.162	0.53-42.92	0.94	0.938	0.17-5.24
Social phobia	2.16	0.482	0.24-19.08	0.83	0.757	0.24-2.81
Agoraphobia	5.93	0.114	0.64-54.78	1.56	0.297	0.67-3.61
PTSD	-	-	-	0.42	0.332	0.07-2.48
GAD	1.22	0.814	0.22-6.65	1.38	0.488	0.55-3.47
Major depressive disorder	0.52	0.217	0.18-1.49	1.04	0.917	0.49-2.19
Alcohol-related disorders	1.51	0.512	0.43-5.33	1.56	0.178	0.81-3.02
Any mental disorder	1.58	0.226	0.75-1.35	1.52	0.054	0.99-2.32

This table used a cross-product term of male/female sex and (i) arthritis/rheumatism and (ii) chronic back/neck pain

Table 22: Effect modification for the adjusted association between chronic pain conditions and mental disorders

Mental disorders	Arthritis/rheumatism			Chronic back/neck pain		
	OR	p-value	95% CI	OR	p-value	95% CI
Any anxiety disorder	2.70	0.090	0.85-8.55	1.12	0.694	0.64-1.94
Panic disorder	5.99	0.119	0.62-57.46	0.95	0.949	0.19-4.83
Social phobia	2.21	0.475	0.24-20.08	0.76	0.647	0.22-2.56
Agoraphobia	5.87	0.114	0.65-53.28	1.53	0.314	0.66-3.53
PTSD	-	-	-	0.54	0.486	0.09-3.10
GAD	1.56	0.627	0.25-9.60	1.77	0.214	0.71-4.38
Major depressive disorder	0.53	0.239	0.18-1.55	1.06	0.883	0.49-2.27
Alcohol-related disorders	1.33	0.668	0.36-4.95	1.39	0.322	0.72-2.71
Any mental disorder	1.59	0.238	0.73-3.44	1.46	0.083	0.95-2.23

This table used a cross-product term of male/female sex and (i) arthritis/rheumatism and (ii) chronic back/neck pain.
Adjusted for marriage, race, location, age, other chronic pain, other medical conditions and traumatic life events

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V. DISCUSSION

The results from this analysis suggest that there is a high prevalence of chronic pain conditions in South Africa: 10% of participants stated that they had arthritis/rheumatism and 26% stated that they had chronic back/neck pain (see Table 2). A higher prevalence of both arthritis/rheumatism and chronic back/neck pain was observed in women. Both arthritis/rheumatism and chronic back/neck pain were associated with older age and lower socioeconomic status. Co-occurring other chronic pain and medical conditions, as well as exposure to traumatic life events, were significant independent predictors of both chronic pain conditions. Overall 12-month DSM-IV anxiety disorders and major depressive disorder were generally more common among those with chronic pain conditions than those without; whereas alcohol-related disorders showed no association with chronic pain conditions. These findings differed somewhat by the sex of the participants. Women had a greater prevalence of chronic pain and all mental disorders compared with men, except for alcohol-related disorders which were predominant in men.

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V.1 CHRONIC PAIN CONDITIONS

The results from this study, like many others around the world, show that chronic pain conditions have a high prevalence in South Africa. Approximately half of the national population suffers from at least one form of chronic pain (see Table 2). This falls within the range of reported community surveys on chronic pain from Western Europe and North America, which estimate that between 25% and 50% of the adult population may suffer from some kind of chronic pain condition (Gureje 2008). The two most common chronic pain conditions – arthritis/rheumatism and chronic back/neck pain – have been the main focus of this study, and will be discussed further within the South African context.

V.1.1 Arthritis/rheumatism

The prevalence of arthritis/rheumatism within the past twelve months in this study was estimated to be 10%, which falls within the range found in other countries, which varies from 9% in Beijing, The People's Republic of China to 19% in the USA (Lee et al. 2007; McWilliams et al. 2004; Patten et al. 2006). Like that of other studies, those with

arthritis/rheumatism in South Africa were predominantly female (73%) and elderly (28% were greater than 60 years old) (Lee et al. 2006; McWilliams et al. 2004). It has been suggested that arthritis/rheumatism has a lower prevalence in developing countries (Lundkvist et al. 2008), with early Europeans in Africa apparently finding almost no rheumatic disease (McGill et al. 2001), compared with the estimated prevalence of 2% rheumatoid arthritis among those over 60 years old in Europe and America (Lundkvist et al. 2008). This historical claim is contradicted by our study, whose findings indicate 34% prevalence among the same age group (see Appendix 7), suggesting a massive, unacknowledged burden. It should be noted, however, that in this study we were not able to differentiate between rheumatoid and osteo-arthritis; OA prevalence is generally higher than that of RA, specifically in older age (Sangha 2000).

There is some indication in the literature that a relationship exists between socioeconomic status and arthritis/rheumatism (particularly rheumatoid arthritis) (Brekke et al. 1999; Sangha 2000). Lee et al. (2007) found the highest prevalence of arthritis in China among those with the least education and among those who were either homemakers or retired. In this study, we found that arthritis/rheumatism was more prevalent among those with lower education, lower family income and unemployment. Overall, participants of low socioeconomic status made up fifty-one percent of those who had arthritis/rheumatism, compared with only twenty-eight percent among those without arthritis/rheumatism ($p < 0.001$) (see Table 3). After adjustment for demographic variables, other chronic pain, other medical conditions and traumatic life events, those with moderate SES had a 45% protection against having arthritis/rheumatism, compared with those of low SES ($p = 0.003$), while those in the high SES group had a 53% protection compared with those in the low SES group($p = 0.002$) (see Table 17). This indicates that arthritis/rheumatism is a disease of poverty, associated with those with the least resources.

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V.1.2 Chronic back/neck pain

In this study, the South African 12-month prevalence of chronic back/neck pain was found to be 26%. Other findings from similar population-based studies include 16% prevalence in Nigeria (Gureje et al. 2007), 29% in the USA (Von Korff et al. 2005), and 9% in Canada (Currie & Wang 2004). The current cross-national survey on chronic back or neck pain found the world prevalence to range between 10% and 42%, with South Africa having the 4th

highest prevalence (Demyttenaere et al. 2007). A recent systematic review on the prevalence of lower back pain in Africa reported that the one-year prevalence of lower back pain among Africans ranged from 14% to 72% (Louw et al. 2007), making it similar to that of western countries. It can be argued, however, that this wide range in Louw et al's findings (2007) is difficult to use definitively, as it is likely to be the result of the fact that many of the studies included were not representative of the population. This is because they were clinic-based or focused on a specific sector of society (e.g. labour force from specific occupations, scholars, etc), thus making it difficult to compare and collate the results. On the other hand, Demyttenaere et al. (2007) used standardised instrumentation across the 17 countries they studied, and also found a large range, suggesting that the prevalence may vary from region to region for unknown reasons. It would not be imprudent to say that the South African prevalence of back and neck pain is at least similar to that of developed countries, if not more, and is certainly greater than that of Nigeria.

The results of this study indicate that the prevalence of chronic back/neck pain is greatest among those aged 40 or older (see Appendix 8). This is supported by other population-based studies which indicate that spinal pain is greater among those aged 35 to 50 (Currie & Wang 2004), and 45 to 60 (Gureje et al. 2007; Von Korff et al. 2005). However, a high proportion of those with chronic back/neck pain were aged 18 to 40, indicating that although the odds of chronic back/neck pain increase with increasing age, a substantial amount of chronic back/neck pain also occurs in young to middle-aged people. Like arthritis/rheumatism, chronic back/neck pain is more prevalent among women and those of lower socioeconomic status. These findings are in keeping with those of other researchers (Currie & Wang 2004; Gureje et al. 2007; Von Korff et al. 2005).

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V.1.3 Association between chronic pain conditions, other chronic pain and other medical conditions

Arthritis/rheumatism in this study was strongly associated with chronic back/neck pain (OR = 3.79; 95% CI: 2.83 - 5.09), and was also associated with both other chronic pain (OR = 1.75) and other medical conditions (OR = 2.47), echoing the same findings in McWilliams et al. (2004). Lee et al. (2007) also reported a two-fold increase in arthritis among those with at least one chronic physical disease compared to those without. The methodology used by McWilliams et al. (2004) and Lee et al. (2007) to determine prevalence of arthritis as well as other chronic conditions was very similar to that of this

study, which may account in part for some of the consistency of findings across the two studies.

Co-occurring chronic pain (OR = 3.12; $p < 0.001$), arthritis/rheumatism (OR = 3.63) and chronic medical conditions (OR = 2.40; $p < 0.001$) were also highly associated with chronic back/neck problems in this study. This is in keeping with the results from a number of other studies (Currie & Wang 2004; Demyttenaere et al. 2007; Gureje et al. 2007; Von Korff et al. 2005). In addition to there being a strong association between the prevalence of chronic back/neck pain and other chronic pain, a prospective cohort study in the Grampian region of Scotland (Smith et al. 2004) found that the presence of other chronic pain and/or other medical conditions was also a predictor for incident back problems.

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V.2 ASSOCIATION BETWEEN CHRONIC PAIN CONDITIONS AND MENTAL DISORDERS

From the results of this study, it is apparent that, like developed countries, South Africans have an association between mental disorders and chronic pain conditions. The magnitude and specific associations show some variation from other studies, however, and will be discussed in more detail below. Overall, mental disorders had a higher frequency among those with either arthritis/rheumatism or chronic back/neck pain than among those who were pain-free. Where anxiety disorders dominated the association with arthritis/rheumatism, both anxiety disorders and major depressive disorder (mood disorder) had strong associations with chronic back/neck pain. In all cases, the crude association was stronger than the adjusted association; however after adjustment statistically significant associations remained between mental health and chronic pain conditions. Alcohol-related disorders were found to have a stronger prevalence among those without pain conditions, and therefore no association was found between alcohol-related disorders and chronic pain conditions.

V.2.1 Association between arthritis/rheumatism and mental disorders

Whereas historically the association between arthritis/rheumatism and mental disorders has focused almost exclusively on depression (Dickens et al. 2002), more recent findings have

suggested at least an equal association between mood and anxiety disorders and arthritis/rheumatism, if not a stronger association between anxiety disorders and arthritis/rheumatism (McWilliams et al. 2003; McWilliams et al. 2004). In this study, the crude association between any mental disorder and arthritis/rheumatism indicated that the strongest association was between arthritis/rheumatism and panic disorder. However, once adjusted for all partial confounders, this association fell away (see Table 12). Furthermore, in the crude association, those with arthritis/rheumatism had a two-fold increased odds of social phobia and GAD, a 1.75 increased odds of MDD and a 1.55 increased odds of agoraphobia. After adjustment for sociodemographic variables (age, race, marital status, sex and SES), other chronic pain, other medical conditions and traumatic life events, only social phobia remained significantly associated with arthritis/rheumatism. In the case of agoraphobia, as well as any anxiety disorder and any mental disorder, a weak and imprecise association with arthritis/rheumatism remained after adjustment. In this study, the association of arthritis/rheumatism with major depressive disorder lost precision and moved towards the null once adjusted for sex, SES and comorbid conditions. No association existed between arthritis/rheumatism and alcohol-related disorders. These findings differ somewhat compared with those from China and the USA (Lee et al. 2007; McWilliams et al. 2003), where similar population-based studies were undertaken, and will be discussed in greater detail below.

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V.2.1.1 Arthritis/rheumatism and depression

A large population-based survey in the USA investigating psychiatric disorders and their correlates had comparable results to those of this study. The American study used those answering positively to having "severe arthritis, rheumatism, or other bone or joint disease" to determine subjects with chronic pain (McWilliams et al. 2003). It also used the CIDI questionnaire, however it was based on the 12-month DSM-III-R mental disorder diagnoses, as opposed to the 12-month DSM-IV mental disorder diagnoses in our study. Although similar to our findings – depression (mood disorder) had the highest prevalence among those with chronic pain (arthritis) – they noted that depression was the most common disorder among those without chronic pain too, whereas in our study agoraphobia (anxiety disorder) was the most common disorder among those without arthritis/rheumatism, followed closely by major depressive disorder (mood disorder) (see Table 6). In the US study, after adjusting for sex, race, income, age and seven common co-existing medical conditions, Americans with chronic pain (arthritic conditions) still had a statistically significant two-fold increased odds of depression. This is in contrast to our study, where, after adjusting for similar

variables, those with arthritis/rheumatism had only 1.3 times increased odds of MDD, and the confidence interval was wide (0.78 - 2.03). Although in our study additional variables were adjusted for (viz. location, marriage and a composite socioeconomic variable that included family income and asset categories), even before adjustment the strength of our association between arthritis/rheumatism and MDD was weaker than theirs (1.75 crude association in South Africa; 2.82* in USA)

Our findings also contrast with those from a large population-based survey in metropolitan China assessing the association between arthritis and physical-mental comorbidity (Lee et al. 2007). In this case, both the CIDI questionnaire and also the 12-month DSM-IV diagnoses were used, as in our study. Those with arthritis in the Chinese study had answered positively to experiencing "inflammation of joints or rheumatism in the previous 12 months". Their results differ substantially between the two cities assessed: in Beijing (a northern city) those with arthritis had a 1.8 increased odds of MDD with hierarchy, though the measure was not statistically significant (95% CI: 0.5 - 6.6), while in Shanghai (a southern city) those with arthritis had a statistically significant 8 times increased odds of MDD with hierarchy. The authors noted that the differences between the cities may have to do with the cultural interpretation of the questionnaire, however further investigation is needed to determine what the underlying reason for the difference is.

Our findings are closer to those from a second survey of the American population (McWilliams et al. 2004). Again the CIDI was used with DSM-III-R diagnoses, and arthritis was assessed in the same way as the previous study (McWilliams et al. 2003), but this time in addition to adjusting for age, sex, education, employment and comorbid medical conditions they also adjusted for comorbid chronic pain conditions. The result was that Americans with arthritis were 1.39 times more likely to have depression than Americans without arthritis (95% CI: 1.04 - 1.87). This is still a more precise measure than ours, but is closer to the null, indicating that the relationship between arthritis and depression could be partially confounded by not only sociodemographics and comorbid conditions but by traumatic life events too. This is supported by Dickens et al (2003), who assessed the relationship between rheumatoid arthritis and what they termed "depressive disorders"

* No crude association is given in this study however the association between arthritis and depression adjusted for age, sex, education and employment was 2.82 (McWilliams et al. 2004).

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(which included depression and anxiety disorders). They found that those with RA who also had depressive disorders had more marked social stress; and that social stress was an independent predictor of depressive symptoms in those with RA (after adjusting for sociodemographic factors).

V.2.1.2 Arthritis/rheumatism and anxiety disorders

As a group, anxiety disorders were more prevalent than mood disorders among those with chronic pain conditions. This was the finding not only in our study but also in McWilliams et al. (2003) and Lee et al. (2007). However, MDD was more prevalent in arthritis/rheumatism than any of the specific anxiety disorders in both our study and that of McWilliams et al. (2003). Comparing the results from the American (McWilliams et al. 2003) and Chinese (Lee et al. 2007) studies with those of our own reveal interesting differences. In order to allow for the comparison, associations adjusted only for sociodemographic variables will be considered; though again it is worth noting that our sociodemographic variables included age, sex, race, marital status, location and a composite socioeconomic variable, whereas in both other studies only age, sex, employment and education were adjusted for. See Table 23 for comparison.

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Table 23: Comparison of results between this study and two international studies

Mental disorders	**USA (McWilliams et al. 2003)**	**China (Lee et al. 2007)**		**South Africa (results from this study)**
	DSM-III-R	**DSM-IV**		**DSM-IV**
	OR (95% CI)	**OR (95% CI)**		**OR (95% CI)**
		Beijing	**Shanghai**	
Any anxiety disorder	2.86 (2.06-3.97)	1.8 (0.7-4.5)	5.9 (1.3-25.09)	1.75 (1.24-2.48)
Panic disorder without agoraphobia	4.27 (2.39-7.61)*	1.0 (0.1-10.0)	-	1.66 (0.49-5.69)
Social phobia	1.92 (1.31-2.82)	-	-	3.08 (1.44-6.60)
Agoraphobia without panic	3.19 (1.87-5.46)*	-	-	1.47 (0.98-2.22)
PTSD	3.69 (2.40-5.68)	-	-	0.62 (0.19-2.02)
GAD	2.30 (1.45-3.67)	2.4 (1.3-4.5)	15.4 (2.9-83.3)	1.34 (0.59-3.05)

All studies compared the association between arthritis/rheumatism and DSM classified anxiety disorders, after adjusting for sociodemographic variables

* Note that in this study panic disorder was classified with and without agoraphobia in one variable; as well as agoraphobia being classified with and without panic in one variable

It is interesting to note that, while a distinct association exists between arthritis/rheumatism and anxiety disorders, the magnitude and statistical significance varies considerably between individual anxiety disorders across the different regions. There is likely to be variation in cultural interpretation of the question relating to arthritis/rheumatism across the countries as well as the interpretation of the mental disorders, although the mental disorders are diagnosed in a more standardised way than arthritis/rheumatism. We are not aware of any cross-regional studies comparing the relationship between arthritis/rheumatism specifically and mental disorders; however Demyttenaere et al. (2007) in a recent cross-national survey of the associations between chronic back and neck pain and mental disorders found considerable variation in their data between countries, and concluded that, without more research investigating diagnostic variation between countries, it is unlikely that meaningful conclusions can be drawn.

No other study that we are aware of has adjusted for the same range of different confounding effects as ours, yet, despite adjusting for sociodemographic variables, other chronic pain, other medical conditions and traumatic life events in the South African population, those with arthritis/rheumatism were still more than twice as likely to have social phobia than those without arthritis/rheumatism. Social phobia is a strong, persisting fear of situations in which embarrassment can occur (Sadock & Sadock 2003). In this study, social phobia was defined using very specific criteria to meet the DSM-IV diagnosis.

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It is interesting to note, however, that in a very recent qualitative study of women living with rheumatoid arthritis in Soweto, South Africa, their key experience, besides pain, was social exclusion (Schneider et al. 2008). These women explained that some of the main difficulties in living with RA included interacting socially, taking part in community activities, and fulfilling social roles. One of the reported difficulties with RA is that the degree of functionality varies day-to-day, and women felt that this compromised the ability of others to validate their disease, as on some days they were capable and independent, and on others, they were not. The result of this is that these women reported a decreased desire to socialise for fear of negative attitudes towards them, or for fear of how others would respond to them. In addition, women felt they were socially excluded due to their own loss of self-confidence as a result of the disease and loss of independence and mobility. These findings confirm the results of a quantitative study in Dublin assessing the effect of RA on women's health status (Minnock et al. 2003). In the Dublin study, pain and social activity (in that order) were

perceived as the most impaired health status dimensions. Although these studies did not measure social phobia, it is interesting to note that from the patients' perspective, loss of social activity is well recognised as a negative sequela to RA. It is also noteworthy that the degree of social phobia differs between South Africa and the USA (see Table 23).

V.2.1.3 Arthritis/rheumatism and alcohol-related disorders

In our study, alcohol-related disorders had a higher prevalence among those without arthritis/rheumatism than among those with arthritis/rheumatism. After adjustment for sociodemographics, other chronic pain, other medical conditions and traumatic life events, however, no association existed between arthritis/rheumatism and alcohol-related disorders. In the Chinese study (Lee et al. 2007), after adjustment for only sex, age, employment and education, the findings echoed ours in Shanghai, yet in Beijing those with arthritis had a 1.9 times increased odds of alcohol-related disorders (95% CI: 0.9 - 4.1).

V.2.2 Association between chronic back/neck pain and mental disorders

The crude association between chronic back/neck pain and 12-month DSM-IV mental disorders indicated a strong association between chronic back/neck pain and PTSD (OR = 4.28), panic disorder, generalised anxiety disorder and major depressive disorder. Weaker associations existed between social phobia and chronic back/neck pain, and between agoraphobia and chronic back/neck pain. After adjustment, a strong association remained between PTSD and chronic back/neck pain (OR = 3.22; 95% CI: 1.18 - 8.76), and a weaker association remained between MDD and chronic back/neck pain (OR = 1.61; 95% CI: 1.09 - 2.38). In the case of GAD and panic disorder, the associations with chronic back/neck pain became imprecise, whereas social phobia and agoraphobia had no association with chronic back/neck pain after adjustment. No association existed between chronic back/neck pain and alcohol-related disorders. These results will be discussed in greater detail below.

V.2.2.1 Chronic back/neck pain and depression

A high prevalence of depression among those with chronic back/neck pain has long been recognised (Currie & Wang 2004; McWilliams et al. 2004). Not until recently, however,

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have population-based studies investigated the association between depression and chronic back/neck pain, and tested the relationship by adjusting for confounders (McWilliams et al. 2004). Depression itself has been loosely used in many studies; however there is a recent move towards classifying mood disorders more rigorously using DSM classification. This study has benefited from the DSM-IV classification, and is therefore easily able to compare results with other studies that have also used the DSM-IV classification. It is worth repeating here that although many other studies have assessed mood disorders by assessing major depressive disorder and dysthmia, dysthmia has not been assessed in this study due to its low prevalence (0.1%) in the dataset (Williams et al. 2008). In comparing mood disorders with this study, therefore, only major depressive disorder was used.

The results from our study are comparable to a few others. Most other studies adjusted for sociodemographic variables and in some cases for other chronic pain, but it seems no other study has adjusted for traumatic life events. Comparing the data that adjusted for sociodemographic variables, mood disorders as a group had the strongest association with chronic back/neck pain (OR = 2.25) in our study, as well as from a survey in the USA which used virtually the same methods as ours to assess chronic spinal pain and physical-mental comorbidity, (OR = 2.5) (Von Korff et al. 2005). However, in a similar survey in Nigeria (Gureje et al. 2007), mood disorders (OR = 2.2) were second to substance disorders (OR = 3.2). In all cases, the point estimate was statistically significant. Where the association between chronic back/neck pain and major depressive disorder was additionally adjusted for other chronic pain and medical conditions, a precise estimate of >1 still occurred (OR of 1.40 in McWilliams et al. 2004; OR of 6.17 in Currie et al. 2004). This seems to indicate that a positive association exists between chronic back/neck pain and major depressive disorder, which is not the result of confounding. Furthermore, this finding has been supported by a recent multi-cultural study which indicated that a pooled odds ratio of 2.3 existed for MDD and chronic spinal pain across 17 different countries, adjusted for age and sex (Demyttenaere et al. 2007). However, it is only since research on the association between mental disorders and back pain has been extended beyond depression, that the high prevalence of anxiety disorders among those with back pain has been established (McWilliams et al. 2004).

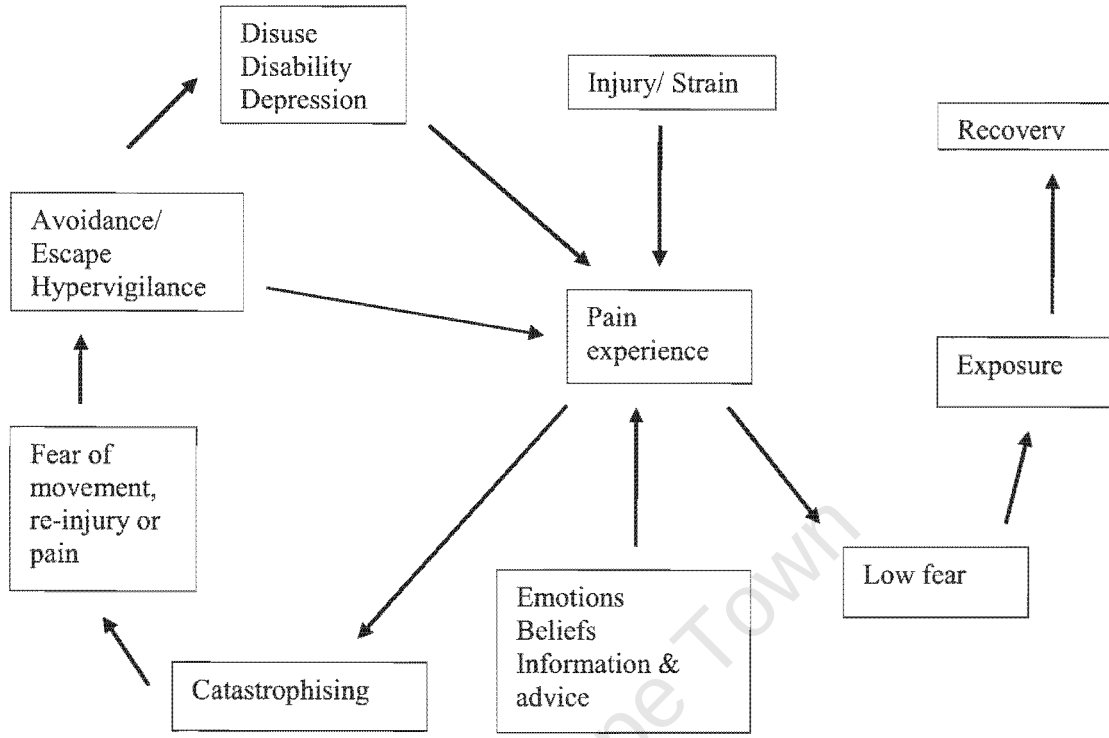
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V.2.2.2 Chronic back/neck pain and anxiety disorders

Similarly to our study, Von Korff et al. (2005), after adjusting for race, age, sex and education, observed a strong association between chronic spinal pain and PTSD (OR = 2.6; 95% CI: 2.1 - 3.3), GAD (OR = 2.6; 95% CI: 2.0 - 3.5), panic disorder (OR = 2.0; 95% 95% CI:1.5 - 2.6) and social phobia (OR = 1.7 (95% CI: 1.3 - 2.2). This is supported by a survey from the USA (McWilliams et al. 2004) where those with chronic back pain had a 2.7 times increased odds of panic attacks and 2.8 times increased odds of GAD (both statistically significant). Furthermore, in the pooled odds ratios of the associations between spinal pain and anxiety disorders from 17 different countries surveyed for the WMH Surveys (Demyttenaere et al.2007), after adjustment for age and sex, the strongest associations were between chronic spinal pain and GAD and between chronic spinal pain and PTSD. Only in a Nigerian survey assessing the comorbidity of chronic spinal pain was the odds ratio of chronic spinal pain and anxiety disorders imprecise and close to the null (Gureje et al. 2007). These findings therefore serve to confirm that a strong association between chronic back/neck pain and anxiety disorders occurs across many different cultural settings, and anxiety disorders need to be recognised in those with chronic spinal pain as much as mood disorders are. The association with PTSD and generalised anxiety disorder in particular are interesting as there is increasing evidence that fear of movement as a result of a back injury can lead to disuse and chronicity, and ultimately to disability (Vlaeyen & Vancleef 2007; Waddell 2004). This phenomenon is termed "fear-avoidance behaviour" and is illustrated in figure 15 below. Pain-related fear evolves if pain from an injury/strain is perceived as threatening, and leads to pain "catastrophising" ("an exaggerated negative orientation towards actual or anticipated pain experiences" (Vlaeyen & Vancleef 2007: 479). This in turn leads to disuse, disability and depression, which exacerbate the pain experience and result in a vicious cycle. Therefore, people with chronic pain who suffer from PTSD or GAD may unwittingly perpetuate their chronic pain experience as a result of avoiding activities.

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Figure 15: The fear-avoidance model



Adapted from Vlaeyen & Vancleef 2007: 480; Waddell 2004: 271

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V.2.2.3 Chronic back/neck pain and alcohol-related disorders

In our study, no association was found between chronic back/neck pain and alcohol-related disorders. This is in contrast with the findings from Nigeria (Gureje et al. 2007), where any substance use disorder had the strongest association with chronic spinal pain (OR = 3.2; 95% CI: 1.2 - 8.0) and the USA (Von Korff et al. 2005), which showed a two-fold increased odds of alcohol-related disorders in those with chronic spinal pain (95% CI: 1.4 - 2.9). In the recent multi-cultural study (Demyttenaere et al. 2007), considerable variation existed between countries regarding an association between alcohol abuse and dependence and chronic spinal pain; however, of the 15 countries that did have an association, only five were statistically significant and the pooled odds ratio was only 1.6 (95% CI: 1.4 - 1.9). The lack of association in our study is surprising, and warrants further investigation.

V.3 CAUSALITY

As this study was a cross-sectional survey, we are unable to make inferences about the direction of the association between mental disorders and chronic pain conditions. Both the chronic pain conditions and the mental disorders were reported 12-month prevalences, and so we are unable to determine which came first: the mental disorders or the chronic pain conditions. Various hypotheses exist (explained in the literature review), and some prospective studies have been conducted, but the direction of the relationship between mental disorders and chronic pain, and therefore the causality of the association, remain unsolved. One of the limitations to studying chronic pain incidence is that the onset of disease is often insidious, and only becomes chronic after some time (Von Korff 1999). Prevalence, however, is a measure of incidence x duration, meaning that it is easier to detect prevalent cases of chronic pain due to their long duration, (by definition 3 to 6 months, though in this study defined as 12 months).

It is postulated that chronic pain and mental disorders could be related in many different ways, and that possibly the type of pain and circumstances leading to the development of chronic pain would determine whether mental disorders are antecedent, consequent or co-occurring with chronic pain. Craig (2006: 234) suggests that clarification can be found "in conceptualizing both pain and emotion as multidimensional and sometimes overlapping processes with reciprocal influences on each other" (see Figure 16). It is certainly well recognised that the emotional component of pain, though long ignored by the biomedical model, is inextricably linked to the experience of pain and associated disability (Bond 2006; Linton & Skevington 1999; Vlaeyen et al. 2007). Further research is required to gain a better understanding of the complex and intricate mechanism which causes chronic pain and mental disorders to be related.

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Figure 16: Inevitable and probable emotions, mood states and feelings as features of painful experience (Craig 2006: 231)

Pain-specific intrinsic discomfort
Basic emotions frequently observed: Fear Anxiety Depression Guilt
Social emotions and feelings often present: Anger Subservience Resignation Rejection Abandonment Guilt

V.4 ROLE OF SEX IN THE PREVALENCE AND ASSOCIATION BETWEEN CHRONIC PAIN CONDITIONS AND MENTAL HEALTH

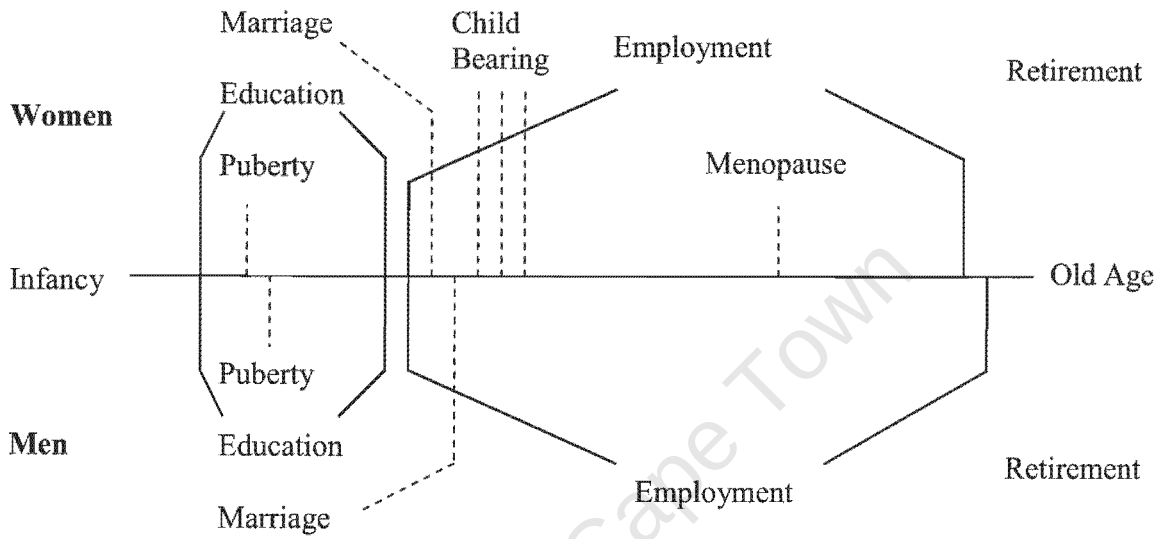
It is well recognised that women generally have a greater prevalence of chronic pain than men (Currie & Wang 2004; Lee et al. 2007; McWilliams et al. 2004), and this is also the finding of our study. However, following stratification by age, this finding has been inconsistent across studies (LeResche 1999). There is some speculation that women may have a different physiological response to pain and diseases like rheumatoid arthritis. One of the reasons suggested for this is the female hormonal and reproductive processes (Brennan & Silman 1995; Lee et al. 2007). Another reason cited for this observation is the fact that women have a longer time span of potential reproduction-related problems (e.g. gynaecological and obstetric conditions vs. prostate problems) (Holdcroft et al. 2006). A third postulated reason is that women on average live longer than men (Holdcroft et al. 2006). Fourthly, the differences in prevalence could also be considered to originate from psychological and sociocultural processes (Holdcroft et al. 2006) (see Figure 17).

The term "gender" incorporates the concepts of how a person represents themselves in society as male or female or how a person is responded to by social institutions on the basis of their gender presentation (Holdcroft et al. 2006). From a gender perspective, it is recognised that women report pain more easily than men; they are also more inclined to seek help for physical and psychological problems than are men (LeResche 1999). Furthermore,

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men and women play different roles in society, and engage in different occupations, which may present different risks for developing and maintaining pain.

Figure 17: Some of the significant life course events that may affect the differential experience of pain among women and men (LeResche 1999: 45)



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It seems that no other study has stratified the association between chronic pain conditions and mental health by sex. The findings of this study are significant, as they demonstrate that men and women with chronic pain conditions in South Africa have different needs regarding mental health interventions; while at the same time also demonstrating that both men and women with chronic pain conditions suffer from co-occurring common mental disorders. This is particularly noteworthy among those with arthritis/rheumatism: both men and women had an increased likelihood of having social phobia (OR = 2.55 and OR = 2.16 respectively, though the measure is less precise in men), yet men had an increased likelihood of major depressive disorder as well, while women did not (OR = 1.67; OR = 0.81 respectively). Women with arthritis/rheumatism also had an increased likelihood of agoraphobia, while men with arthritis/rheumatism didn't (however the estimates of the association between arthritis/rheumatism and (a) MDD and (b) agoraphobia had wide confidence intervals). In contrast, of those with chronic back/neck pain, though both men and women had an increased odds of panic disorder and PTSD, the strength of the association and precision of the estimate was far stronger in men than in women (OR = 4.61; OR = 2.58 respectively for PTSD; OR = 2.79; OR = 1.44 respectively for panic disorder). Yet the opposite was true for the association with MDD, which, although similar in strength between the two sexes, was

more precise in women. Additionally, women with chronic back/neck pain had two-fold increased odds of GAD, while men had no association; men with chronic back/neck pain had a 1.55 increased odds of social phobia, while women did not, although even in men the estimate had a wide confidence interval (see Tables 15 and 16).

Finally, while the results indicate that on the whole the association between chronic pain conditions and all mental disorders was greater in women, it is noteworthy that some of the specific mental disorders where more strongly associated to chronic pain conditions in men: in particular, the association between PTSD and chronic back/neck pain was stronger in men, as well as the association between MDD and arthritis/rheumatism (see Tables 21 and 22). These findings demonstrate that it is extremely important that mental disorders are not overlooked in men with chronic pain conditions.

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V.5 OTHER RISK FACTORS FOR CHRONIC PAIN CONDITIONS

This section describes the risk factors for arthritis/rheumatism and chronic back/neck pain. It is divided into sub-sections on socioeconomic status, other chronic pain and medical conditions, and traumatic life events.

V.5.1 Socioeconomic status

In this study, both chronic pain conditions were associated with lower socioeconomic status. Of interest is that, after adjustment, increased SES was less protective in chronic back/neck pain (35% and 31% respectively for moderate and high SES compared with low SES, $p < 0.001$) than in arthritis/rheumatism (45% and 53% respectively for moderate and high SES compared with low SES, $p < 0.001$). This seems to indicate that chronic back/neck pain is less driven by poverty and age than is arthritis/rheumatism. Given that in the relationship between low SES and chronic pain conditions we do not know which comes first, we can hypothesise that the association could work in both directions. Where those with chronic pain conditions have a reduced ability to work and possible increased utilisation of medical facilities and public transport when they may previously have walked (Minnock 2003), their condition may be part of what causes their poverty. However, the opposite may also be true: low SES limits opportunities for access to timely medical attention, leading to chronicity.

Limited job opportunities due to low education levels could also result in difficulty finding alternative jobs if the pain condition limits the primary job, e.g. in unskilled manual labour or domestic work. These unskilled jobs themselves place great demand on the skeletal system, which in turn could lead to chronic pain conditions (Brekke et al. 1999; Minnock et al. 2003; Schneider et al. 2008).

V.5.2 Other chronic pain and medical conditions

Strong associations between chronic pain conditions and comorbid pain, and between chronic pain conditions and comorbid medical conditions, were found in this study. This has been the finding of a number of other studies too (Currie et al. 2005; Demyttenaere et al. 2007; Gureje et al. 2007; Lee et al. 2007; McWilliams et al. 2004; Von Korff et al. 2005). Given that recent findings indicate a stronger association between chronic pain and mental disorders where more than one pain condition is prevalent (Gureje et al. 2008), it should come as no surprise that the chronic pain conditions examined in this study had a strong association with other chronic conditions. Furthermore, a correlation has been shown to exist between low socioeconomic status and perceived low "self-efficacy" among those with chronic pain, which translates into reduced perceived health status (Brekke et al. 1999). Although reported medical conditions were supposedly diagnosed by a medical professional, there was no way in our study of verifying that these medical conditions did in fact exist, and at least some may be accounted for by mere perception of illness. It has also been shown that perceived ill health can increase susceptibility to disease as well as mortality rates via a set of postulated complex processes including lifetime social circumstances, behavioural and physiological risk factors, adherence to health recommendations and psychoneuroimmunological mechanisms (Brekke et al. 1999).

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V.5.3 Traumatic life events

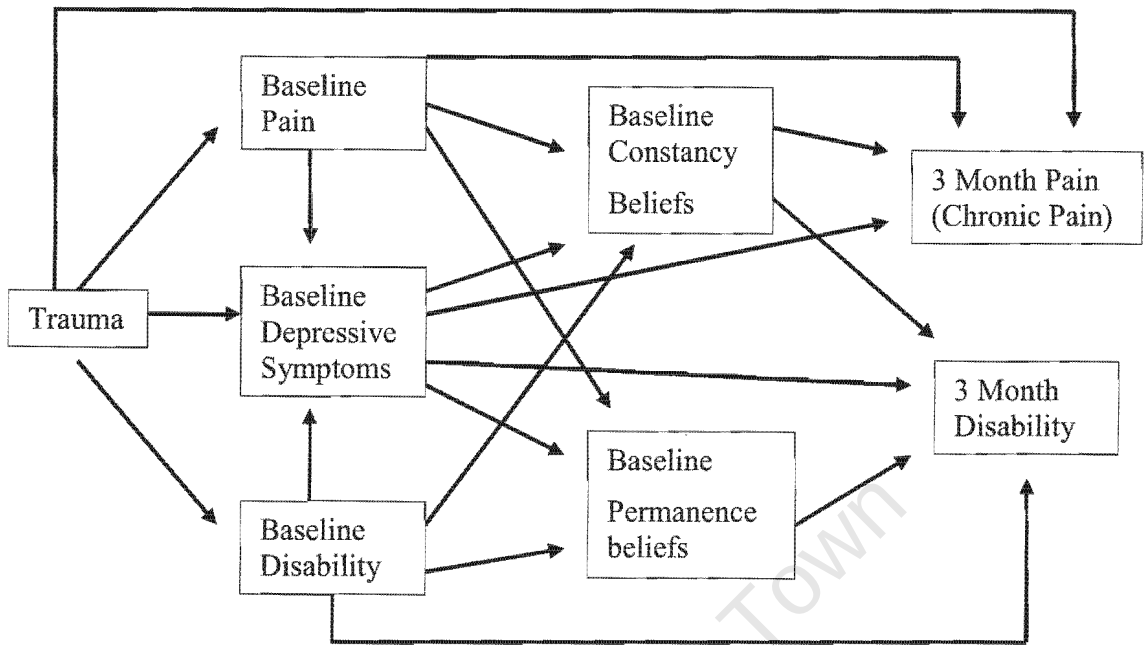
In this study, no association was found between arthritis/rheumatism and four or less traumatic life events. Participants with exposure to 5 or more traumatic life events had 1.5 times increase odds of having arthritis/rheumatism, although the confidence interval was wide (95% CI: 0.82 - 2.40). In a case-control clinical study in the USA comparing the histories of childhood and adult physical and sexual trauma among those with fibromyalgia and those with RA, participants with fibromyalgia were found to have a higher association with victimisation, particularly adult physical abuse than those with RA (Walker et al. 1997).

Although there may be a link between structural bony trauma and osteoarthritis (Sangha 2000), the crude measure of arthritis/rheumatism in this data did not allow us to explore this in more detail (the questionnaire was focused on mental disorders rather than physical trauma). A small, imprecise association did however exist between arthritis/rheumatism and life threatening 'other accidents' as well as between arthritis/rheumatism and having been beaten badly by a spouse (see Table 18). It is difficult to determine from these results whether it is the physical event or the emotional event that is associated, and maybe it is unwise to separate these two entities. Nonetheless, given that this study was a survey, the direction of the association cannot be determined.

Interestingly, a significant association existed between the presence of more than one traumatic life event and chronic back/neck pain. This association seemed to behave in a dose-response manner, increasing as the exposure to traumatic life events increased (OR = 1.52 for one to two events, and OR = 1.82 for more than five events). Although there is acceptance that exposure to trauma is associated with chronic pain, most of the research that supports this theory comes from case-control studies and surveys which cannot explain causal factors or shed light on temporality (Raphael et al. 2001; Tunks et al. 2008). A prospective cohort study found that in fact the association between legally certified abused children and adulthood pain was not associated; however using retrospective data from the same study, those who self-reported childhood abuse did have an association with adulthood pain symptoms (Raphael et al. 2001). The authors concluded that the mechanism by which childhood trauma may lead to chronic pain in adulthood is more complex than originally thought and warrants further investigation. On the other hand, another prospective cohort study following acute neck and back pain cases forward in time (Young Casey et al. 2008), determined that reported exposure to cumulative traumatic life events independently predicted greater pain intensity at 3 months. (See Figure 18 for a hypothesised model of the mechanism by which trauma influences acute and chronic pain conditions). The findings of our study are in keeping with those of Young Casey et al. (2008); however it is worth noting that in both cases, traumatic life events were self-reported.

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Figure 18: Hypothesised model of transition from acute to chronic pain and disability (Young Casey et al. 2008: 70)



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V.6 STRENGTHS AND LIMITATIONS OF THE STUDY

In interpreting the results of this study, it is important to consider its strengths and limitations. These shall be discussed in more detail below.

V.6.1 Strengths of study

One of the key strengths of this study is that it used nationally representative data. This makes it more possible to generalise the findings to the South African population, as opposed to the numerous studies which have used only clinical samples. This appears to be the first study of its kind in South Africa. No apparent data exists on the prevalence and demographics of people with pain conditions in South Africa. Furthermore, there have been no population-based studies assessing the association between mental disorders and chronic pain in South Africa, and only one other from Africa (Gureje et al. 2007). Much previous research has come from European countries or the USA, and much of the research has been limited to clinical populations.

In addition, the methods of this study were carefully structured to minimise bias, and overall the response rate was good. The questionnaire was comprehensively designed in order to account for potential confounding variables. We were therefore able to adjust for sociodemographics as well as comorbid pain and medical conditions, something that not all studies have done, in spite of the fact that both comorbid pain and other medical conditions partially confound the relationship between chronic pain conditions and mental health. In addition, we were able to adjust for traumatic life events, and can report that, in spite of this adjustment, a relationship between chronic pain conditions and mental health persisted.

Lastly, this is the first study to assess sex as an effect modifier to the relationship between chronic pain conditions and mental health; an endeavour that yielded interesting results.

V.6.2 Limitations of interpretation

First, the methodological instrument (CIDI 3.0) has not been tested for concordance in diagnosis of DSM-IV mental disorders in South Africa. However, when compared with the Structured Clinician Interview for DSM-IV (SCID) in France, Italy, Spain and the USA, 12-month mental disorders showed good comparability between the layperson-administered and clinician-administered groups (Haro et al. 2006). Poor concordance in South Africa could lead to random misclassification, which would tend to underestimate the association between mental health and chronic pain conditions in this study, and/or to systematic misclassification. It is recognised that culture can have an affect on the ability to recall or report particular symptoms, as well as on the clinical presentation of specific psychiatric disorders (Demyttenaere et al. 2007; Williams et al. 2007). This notwithstanding, due to the consistency of findings related to the association of mental health and chronic pain across many cultural settings, as in the study by Demyttenaere et al. (2007), it is unlikely that the association would fall away after adjusting for cultural differences. Furthermore, we did not have sufficient numbers in minority groups (Coloureds, Whites and Indian/Asians) to detect significant differences across race. Yet race in this data was used as a proxy for socioeconomic status, due to South Africa's history, and even after adjusting for socioeconomic differences, which were comprehensively assessed, an association between mental health and chronic pain remained.

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Second, the chronic pain conditions were self-reported, and did not comprehensively assess severity or duration. This notwithstanding, it is important to consider that this research was designed primarily for the World Mental Health surveys with a focus on mental health, and it was therefore not feasible to have a more comprehensive assessment of the pain conditions. For both arthritis/rheumatism and chronic back/neck pain, previous studies have shown reasonable concordance between self-reported and clinically-diagnosed pain conditions (Demyttenaere et al. 2007; Lee et al. 2007; Patten et al. 2006). Another aspect of self-reported arthritis/rheumatism is that it does not differentiate between osteoarthritis and rheumatoid arthritis. Despite this, the focus of this study was on the painful aspect of arthritis/rheumatism, which is considered to be the predominant problem in both osteo- and rheumatoid arthritis. Furthermore, previous meta-analyses of the association of depression and arthritis/rheumatism found only small differences between osteo- and rheumatoid arthritis (Dickens et al. 2002). Another consideration is that no time definition was given for chronic pain conditions. Chronic pain is defined to be at least 3 months. Participants were asked to report whether in the past 12 months they had had chronic back/neck problems, and as a result of self-interpretation of the word chronic, some cases may well be acute rather than chronic. Similar questions to this, however, have been used in a number of other studies assessing chronic pain conditions (Demyttenaere et al. 2007; Gureje et al. 2007; McWilliams et al. 2004; Von Korff et al. 2005), and the results across these studies are therefore comparable, even though they may overstate the prevalence of chronic back/neck pain.

Third, as this is a cross-sectional study, no inferences can be made about temporality. Therefore whether chronic pain conditions come before, after or concurrently with, mental disorders will need to be answered in future research.

Fourth, the response rate to the questions on alcohol use and abuse was extremely low, varying between 10% and 30% valid answers, rendering a very low sample size for any alcohol-related disorders, and therefore making it difficult to judge whether an association between chronic pain and alcohol-related disorders does in fact exist in South Africa. It is curious that in the only other African country where the association has been studied, Nigeria, alcohol-related disorders formed the predominant association with chronic spinal pain.

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V.7 IMPLICATIONS OF THE STUDY

The findings from this study are notable in a South African context as they appear to be the first nationally representative data on the prevalence of both arthritis/rheumatism and chronic back/neck pain. What the findings indicate is that, like numerous other countries, chronic pain conditions are a considerable burden for the South African population. With a 10% prevalence of arthritis/rheumatism and 26% prevalence of chronic back/neck pain, as well as the association between chronic pain and both depression and anxiety disorders, it is imperative that appropriate assessment and treatment strategies are in place. This means that first-line practitioners treating people with chronic pain need to be made aware of these prevalences and associations, and implement the most effective approach for these patients in order to prevent chronicity and disability. Practitioners need to make use of effective screening tools for mental disorders, recognising that anxiety disorders and depression are commonly associated with chronic pain (Rush et al. 2000; Smith et al. 2004). Furthermore, structured interviews which highlight potential problem areas, such as "yellow flags" should be utilized. "Yellow flags" were designed specifically for back pain, but have the potential to be used in other areas of chronic pain. The following is an example of structured interview prompts used to assess the presence of "yellow flags" (from Main and de C Williams 2002):

What do you think is the cause of your back pain? What are you expecting will help you? How are others responding to your back pain (employer, co-workers, family)? What are you doing to cope with your back pain? Have you had time off work in the past with back pain? Do you think that you will ever return to work? When?

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Practitioners should be aware of catastrophising thoughts, fear of movement/re-injury resulting in avoidance of any physical activity, and any overt pain behaviour (behaviour which suggests the presence of pain) that are potential warning signs in the early stages of pain that the patient is not coping well. In addition, any social or employment issues need to be recognised, as well as a history of abuse or comorbid medical conditions (Tunks et al. 2008).The cognitive-behavioural therapy (CBT) model has been recognised in developed countries as the most effective tool for chronic pain management (Turk et al. 2008; Vlaeyen et al. 2007). The aim of the treatment is to provide people with better coping skills and to develop a sense of empowerment that will assist them even once treatment stops. Generally, CBT involves a combination of problem solving, goal setting, stress management, relaxation techniques, assertiveness and pacing of activities (Turk et al. 2008). The result is that

patients develop a sense of mastery over their pain, and with that their mood improves (Turk et al. 2008).

The techniques used in CBT can be employed by an individual practitioner or in an interdisciplinary pain management programme. The latter is increasingly recognised as the most cost-effective way of managing pain (Gatchel & Okifuji 2006). The interdisciplinary team generally consists of physiotherapists, medical doctors/specialists and psychologists (Gatchel & Okifuji 2006); occupational therapists could also be members of the team. In the overburdened health system in South African, these pain programs may seem beyond our limitations, yet the appropriate treatment of those with chronic pain has the potential to decrease the numerous *ad hoc* demands for pain relief and associated mental anguish in those who are currently poorly managed, as well as to increase their capacity to return to work where possible. Furthermore, it has the potential to curtail unnecessary and costly surgery. A recent prospective clinical study of 234 South Africans booked for back surgery who underwent a 6-week intervention of active rehabilitation including cognitive therapy found that only 19 patients ultimately required surgery following the intervention (Engelbrecht et al. 2008). Frohlich & Shipton (2007) suggest that, in light of increasing demands for pain management over and beyond the existing burden of chronic pain, by those living with HIV/AIDS, appropriate cost-effective pain management programmes are absolutely necessary in South Africa.

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Von Korff et al. (1998) also demonstrated in a randomised trial of interventions that layperson-administered pain management groups were more effective than usual care. These lay-leaders were people who had back pain themselves, and spent two days in training. Thereafter, two leaders at a time co-facilitated four 2-hour classes held once a week. The highly structured intervention was based on Stanford University's layperson self-management class for arthritic and chronic diseases (Lorig et al. 1994 and Lorig et al. 1995 in Von Korff et al. 1998), which gave instruction in the following areas: sources of pain, factors contributing to changes in pain, body mechanics and posture, pacing of activities, the role of self-talk in managing back pain, handling flare-ups, and working with health-care providers.

In light of the success of the abovementioned layperson-administered pain management programme, there is no excuse for South Africans not to have similar pain management programmes operating in our primary care centres. Our current resources for chronic pain are extremely limited (Frohlich & Shipton 2007). It seems that there is no time to waste in rolling out cost-effective treatment programmes for those that suffer from chronic pain. It is worth noting, however, that even in the USA the move to support these pain management programmes and clinics has been hampered by resistance from third party funders, who have failed to see the long-term economic benefits of these programmes (Gatchel & Okifuji 2006). This leads us to believe that without policy support to developing new approaches to chronic pain management, we are unlikely to be able to implement new changes in South Africa.

Further research in chronic pain would be helpful in putting forward a case to policy-makers. It is not known whether chronic pain conditions and comorbid pain/mental disorders are associated with significant disability in South Africa in the same way that they are in more affluent countries. Judging from the findings of Gureje et al. (2007), disability seems to vary according to country contexts: Nigerian adults were found to experience less of a loss of role performance than their American equivalents (Gureje et al. 2007; Von Korff et al. 2005). A previous cross-cultural study on chronic pain and related disability, also found a range of disability levels across the 15 countries assessed (which covered Africa, Asia, Europe and America) (Gureje et al. 1998). Assessing disability would give us a clearer idea of the impact of chronic pain on people's day-to-day lives, as well as the economic impact of loss of work, and also some guidance as to the interventions required. This topic would need to be explored in future research. An additional area for research would be a cost-effectiveness study comparing a CBT-type intervention with existing services for those with chronic back/neck pain and arthritis/rheumatism in South Africa.

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V.8 Conclusion

This study has demonstrated that chronic pain conditions are at least as prevalent in South Africa as they are in developed countries. In addition, it has brought attention to the fact that these conditions are most frequent among women, the elderly and those of lower socioeconomic status. Furthermore, both arthritis/rheumatism and chronic back/neck pain are significantly associated with anxiety disorders, and chronic back/neck pain is also associated

with major depressive disorder. Though on the whole the association between chronic pain conditions and mental disorders is stronger in women, men also suffer from this association, specifically with regard to depression and arthritis/rheumatism, and PTSD and chronic back/neck pain. These findings should serve to propel South Africans into adopting the best methodologies to recognise, assess and address these comorbid conditions. Due care should be taken to educate practitioners and the public alike about the risk factors for pain chronicity and the association of chronic pain with common mental disorders. Cost-effective primary-care-level interventions should be instituted to reduce personal morbidity, loss of work and excessive drain on health care services. While interdisciplinary pain management programmes should be implemented at tertiary-care-level to minimise costly surgery for chronic pain.

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Appendix 1: DSM-IV-TR Diagnostic Criteria for Major Depressive Disorder*

Single Episode

A. Presence of single major depressive episode.

B. The major depressive episode is not better accounted for by schizoaffective disorder and is not superimposed on schizophrenia, schizophreniform disorder, delusional disorder, or psychotic disorder not otherwise specified.

C. There has never been a manic episode, a mixed episode, or a hypomanic episode. Note: This exclusion does not apply if all of the maniclike, mixedlike, or hypomaniclike episodes are substance or treatment induced or are due to the direct physiological effects of a general medical condition.

Recurrent

A. Presence of two or more major depressive episodes.
Note: To be considered separate episodes, there must be an interval of at least 2 consecutive months in which criteria are not met for a major depressive episode.

B. The major depressive episodes are not better accounted for by schizoaffective disorder and are not superimposed on schizophrenia, schizophreniform disorder, delusional disorder, or psychotic disorder not otherwise specified.

C. There has never been a manic episode, a mixed episode, or a hypomanic episode. Note: This exclusion does not apply if all of the maniclike, mixedlike, or hypomaniclike episodes are substance or treatment induced or are due to the direct physiological effects of a general medical condition.

For both single episode and recurrent MDD
Specify:
Severity; psychotic features, remission specifiers
Chronic
With catatonic features
With melancholic features
With postpartum onset

For recurrent MDD
Specify:
Longitudinal course specifiers (with and without interepisode recovery)
With seasonal pattern

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* DSM-IV-TR Criteria obtained from American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 4th ed. Text rev. Washington, DC: American Psychiatric Association, 2000 In Sadock &Sadock 2003: 545

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DSM-IV-TR Criteria for Major Depressive Episode*

A. Five (or more) of the following symptoms have been present during the same 2-week period and represent a change from previous functioning; at least one of the symptoms is either (1) depressed mood or (2) loss of interest or pleasure.
Note: Do not include symptoms that are clearly due to a general medical condition, or mood-incongruent delusions or hallucinations.
(1) depressed mood most of the day, nearly every day, as indicated by either subjective report (e.g. feels sad or empty) or observation made by others (e.g. appears tearful).
Note: In children and adolescents, can be irritable mood

(2) markedly diminished interest or pleasure in all, or almost all, activities most of the day, nearly every day (as indicated by either subjective account or observation made by others)

(3) significant weight loss when not dieting or weight gain (e.g. a change of more than 5% of body weight in a month), or decrease or increase in appetite nearly every day. Note: In children, consider failure to make expected weight gains.

(4) insomnia or hypersomnia nearly every day

(5) psychomotor agitation or retardation nearly every day (observable by others, not merely subjective feelings of restlessness or being slowed down)
(6) fatigue or loss of energy nearly every day

(7) feelings of worthlessness or excessive or inappropriate guilt (which may be delusional) nearly every day (not merely self-reproach or guilt about being sick)

(8) diminished ability to think or concentrate, or indecisiveness, nearly every day (either by subjective account or as observed by others)

(9) recurrent thoughts of death (not just fear of dying), recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide

B. The symptoms do not meet the criteria for a mixed episode

C. The symptoms cause clinically significant distress or impairment in social, occupational, or other important areas of functioning.

D. The symptoms are not due to the direct physiological effects of a substance (e.g. a drug of abuse, medication) or a general medical condition (e.g. hyperthyroidism)

E. The symptoms are not better accounted for by bereavement, i.e. after the loss of a loved one, the symptoms persist for longer than 2 months or are characterised by marked functional impairment, morbid preoccupation with worthlessness, suicidal ideation, psychotic symptoms or psychomotor retardation

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* DSM-IV-TR Criteria obtained from American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 4th ed. Text rev. Washington, DC: American Psychiatric Association, 2000 In Sadock &Sadock 2003: 542

Appendix 2: DSM-IV-TR Diagnostic Criteria for Panic Disorder without Agoraphobia*

A. Both (1) and (2):
(1) recurrent unexpected panic attacks
(2) at least one of the attacks has been followed by 1 month (or more) of one (or more) of the following:
(a) persistent concern about having additional attacks
(b) worry about the implications of the attack or its consequences (e.g. losing control, having a heart attack, "going crazy")
(c) a significant change in behaviour related to the attacks

B. Absence of agoraphobia

C. The panic attacks are not due to the direct physiological effects of a substance (e.g. a drug of abuse, a medication) or a general medical condition (e.g. hyperthyroidism).

D. The panic attacks are not better accounted for by another mental disorder, such as social phobia (e.g. occurring on exposure to feared social situations), specific phobia (e.g. on exposure to a specific phobic situation), obsessive-compulsive disorder (e.g. on exposure to dirt in someone with obsession about contamination), post-traumatic stress disorder (e.g. in response to stimuli associated with a severe stressor), or separation anxiety disorder (e.g. in response to being away from home or close relatives).

DSM-IV-TR Criteria for Panic Attack

Note: A panic attack is not a codable disorder. Code the specific diagnosis in which panic attack occurs (e.g. panic disorder with agoraphobia)

A discrete period of intense fear or discomfort, in which four (or more) of the following symptoms developed abruptly and reached a peak within 10 minutes:
(1) palpitations, pounding heart, or accelerated heart rate
(2) sweating
(3) trembling or shaking
(4) sensations of shortness of breath or smothering
(5) feeling of choking
(6) chest pain or discomfort
(7) nausea or abdominal distress
(8) feeling dizzy, unsteady, lightheaded, or faint
(9) derealization (feelings of unreality) or depersonalization (being detached from oneself)
(10) fear of losing control or going crazy
(11) fear of dying
(12) paresthesia (numbness or tingling sensations)
(13) chills or hot flushes

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* DSM-IV-TR Criteria obtained from American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 4th ed. Text rev. Washington, DC: American Psychiatric Association, 2000 In Sadock &Sadock 2003: 602

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Appendix 3: DSM-IV-TR Criteria for Agoraphobia*

Note: Agoraphobia is not a codable disorder. Code the specific disorder in which the agoraphobia occurs (e.g. panic disorder with agoraphobia or agoraphobia without history of panic disorder.

A. Anxiety about being in places or situations from which escape might be difficult (or embarrassing) or in which help may not be available in the event of having an unexpected or situationally predisposed panic attack or paniclike symptoms. Agoraphobia fears typically involve characteristic clusters of situations that include being outside the home alone; being in a crowd or standing in a line; being on a bridge; and travelling in a bus, train, automobile.

Note: Consider the diagnosis of specific phobia if the avoidance is limited to one or only a few specific situations, or social phobia if the avoidance is limited to social situations.

B. The situations are avoided (e.g. travel is restricted) or else are endured with marked distress or with anxiety about a panic attack or panic like symptoms, or require the presence of a companion.

C. The anxiety or phobic avoidance is not better accounted for by another mental disorder, such as social phobia (e.g. avoidance limited to social situations because of fear of embarrasment0, specific phobia (e.g. avoidance limited to a single situation like elevators), obsessive-compulsive disorder (e.g. avoidance of dirt in someone with an obsession about contamination), post-traumatic stress disorder (e.g. avoidance of stimuli associated with a severe stressor), or separation anxiety disorder (e.g. avoidance of leaving home or relatives).

DSM-IV-TR Diagnostic Criteria for Agoraphobia without History of Panic Disorder

A. The presence of agoraphobia related to fear of developing paniclike symptoms (e.g. dizziness or diarrhoea).

B. Criteria have never been met for panic disorder.

C. The disturbance is not due to the direct physiological effects of a substance (e.g. a drug of abuse, a medication0 or a general medical condition.

D. If an associated general medical condition is present, the fear described in Criterion A is clearly in excess of that usually associated with the condition.

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* DSM-IV-TR Criteria obtained from American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 4th ed. Text rev. Washington, DC: American Psychiatric Association, 2000 In Sadock &Sadock 2003: 603

Appendix 4: DSM-IV-TR Diagnostic Criteria for Social Phobia*

A. A marked and persistent fear of one or more social or performance situations in which the person is exposed to unfamiliar people or to possible scrutiny by others. The individual fears that he or she will act in a way (or show anxiety symptoms) that will be humiliating or embarrassing. Note: In children, there must be evidence of the capacity for age-appropriate social relationships with familiar people and the anxiety must occur in peer settings, not just in interactions with adults.

B. Exposure to the feared social situation almost invariably provokes anxiety, which may take the form of a situationally bound or situationally predisposed panic attack. Note: In children, the anxiety may be expressed by crying, tantrums, freezing, or shrinking from social situations with unfamiliar people.

C. The person recognizes that the fear is excessive or unreasonable. Note: In children, this may be absent.

D. The feared social or performance situations are avoided or else are endured with intense anxiety or distress.

E. The avoidance, anxious anticipation, or distress of the feared social or performance situation (s) interferes significantly with the person's normal routine, occupational (academic) functioning, or social activities or relationships, or there is marked distress about having the phobia.

F. In individuals under age 18 years, the duration is at least 6 months.

G. The fear or avoidance is not due to the direct physiological effects of a substance (e.g. a drug of abuse, a medication) or a general medical condition and is not better accounted for by another mental disorder (e.g. panic disorder with or without agoraphobia, separation anxiety disorder, body dysmorphic disorder, a pervasive developmental disorder, or schizoid personality disorder).

H. If a general medical condition or another mental disorder is present, the fear in Criterion A is unrelated to it, e.g. the fear is not of stuttering, trembling in Parkinson's disease, or exhibiting abnormal eating behaviour in anorexia nervosa or bulimia nervosa.

Specify if:
Generalized: if the fears include most social situations (also consider the additional diagnosis of avoidant personality disorder)

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* DSM-IV-TR Criteria obtained from American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 4th ed. Text rev. Washington, DC: American Psychiatric Association, 2000 In Sadock &Sadock 2003: 613

Appendix 5: DSM-IV-TR Diagnostic Criteria for Post Traumatic Stress Disorder*

A. The person has been exposed to a traumatic event in which both of the following were present:
(1) the person experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others.
(2) the person's response involved intense fear, helplessness, or horror. Note: In children, this may be expressed instead by disorganized, agitated behaviour

B. The traumatic event is persistently re-experienced in one (or more) of the following ways:
(1) recurrent and intrusive distressing recollections of the event, including images, thoughts, or perceptions. Note: in young children, repetitive play may occur in which themes or aspects of the trauma are expressed.
(2) recurrent distressing dreams of the event. Note: In children, there may be frightening dreams without recognizable content.
(3) acting or feeling as if the traumatic event were recurring (includes a sense of reliving the experience, illusions, hallucinations, and dissociative flashback episodes, including those that occur on awakening and when intoxicated. Note: in young children trauma specific re-enactment may occur.
(4) intense psychological distress at exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event.
(5) physiological reactivity on exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event.

C. Persistent avoidance of stimuli associated with the trauma and numbing of general responsiveness (not present before the trauma), as indicated by three (or more) of the following:
(1) efforts to avoid thoughts, feelings, or conversations associated with the trauma
(2) efforts to avoid activities, places, or people that arouse recollections of the trauma
(3) inability to recall an important aspect of the trauma
(4) markedly diminished interest or participation in significant activities
(5) feeling of detachment or estrangement from others
(6) restricted range of affect (e.g. unable to have loving feelings)
(7) sense of a foreshortened future (e.g. does not expect to have a career, marriage, children, or a normal life span)

D. Persistent symptoms of increased arousal (not present before the trauma), as indicated by two (or more) of the following:
(1) difficulty falling or staying asleep
(2) irritability or outburst of anger
(3) difficulty concentrating
(4) hypervigilance

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* DSM-IV-TR Criteria obtained from American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 4th ed. Text rev. Washington, DC: American Psychiatric Association, 2000 In Sadock &Sadock 2003: 626

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(5) exaggerated startle response

E. Duration of the disturbance (symptoms in Criteria B, C and D) is more than 1 month.

F. The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.

Specify if:
Acute: if duration of symptoms is less than 3 months
Chronic: if duration of symptoms is 3 months or more

Specify if:
With delayed onset: if onset of symptoms is at least 6 months after the stressor

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Appendix 6: DSM-IV-TR Diagnostic Criteria for Generalized Anxiety Disorder*

A. Excessive anxiety and worry (apprehensive expectation), occurring more days than not for at least 6 months, about a number of events or activities (such as work or school performance).

B. The person finds it difficult to control the worry.

C. The anxiety and worry are associated with three (or more) of the following six symptoms (with at least some symptoms present for more days than not for the past 6 months). Note: Only one item is required in children.
(1) restlessness or feeling keyed up or on the edge
(2) being easily fatigued
(3) difficulty concentrating or mind going blank
(4) irritability
(5) muscle tension
(6) sleep disturbance (difficulty falling or staying asleep, or restless unsatisfying sleep)

D. The focus of the anxiety and worry is not confined to features of an Axis I disorder, e.g. the anxiety or worry is not about having a panic attack (as in a panic disorder), being embarrassed in public (as in social phobia), being contaminated (as in obsessive-compulsive disorder), being away from home or close relatives (as in separation anxiety disorder), gaining weight(as in anorexia nervosa), having multiple physical complaints (as in somatization disorder), or having a serious illness (as in hypochondriasis), and the anxiety and worry do not occur exclusively during posttraumatic stress disorder.

E. The anxiety, worry or physical symptoms cause clinically significant distress or impairment in social, occupational, or other important areas of functioning.

F. The disturbance is not due to the direct physiological effects of a substance (e.g. drug of abuse, a medication) or a general medical condition (e.g. hyperthyroidism) and does not occur exclusively during a mood disorder, a psychotic disorder, or a pervasive developmental disorder.

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* DSM-IV-TR Criteria obtained from American Psychiatric Association. Diagnostic and Statistical Manual of Mental disorders. 4th ed. Test rev. Washington, DC: American Psychiatric Association, 2000 In Sadock &Sadock 2003: 634

Appendix 7: Description of sample prevalence stratified by arthritis/rheumatism (row percentages)

Demographic characteristics	Categories	No Arthritis/ rheumatism	Arthritis/ rheumatism	P-value
Age in years %	18-29	97.4	2.44	<0.001
	30-39	93.8	6.22	
	40-49	88.5	11.6	
	50-59	77.0	23.0	
	60+	66.3	33.7	
Sex	Female	86.2	13.8	<0.001
	Male	94.1	5.9	
Race	Black	90.5	9.5	0.257
	Coloured	88.3	11.7	
	White	87.3	12.7	
	Indian/ Asian	89.0	11.0	
Marital Status	Currently married	86.9	13.1	<0.001
	Currently unmarried	92.8	7.2	
Location	Urban	89.9	10.2	0.811
	Rural	90.0	10.0	
Education	None	78.4	21.6	<0.001
	Grade 1-7	81.9	18.1	
	Grade 8-11	90.9	9.1	
	Matric	95.8	4.2	
	Matric+	93.1	6.9	
Employment status	Currently employed	92.74	7.26	0.011
	Currently unemployed	88.6	11.4	
Family Income	None	87.1	12.9	0.063
	R1-5000	88.8	11.25	
	R5001-25 000	90.9	9.2	
	R25 000 -100 000	90.9	9.1	
	R100 000+	91.6	8.4	
Asset Index	None-5	88.0	12.0	0.023
	6-12	91.3	8.7	
	13-17	90.6	9.4	
Socioeconomic status	Low	83.1	17.0	<0.001
	Moderate	92.8	7.2	
	High	92.9	7.1	
Chronic back/neck problems		73.9	26.1	<0.001
Other chronic pain		82.9	17.1	<0.001
Other chronic medical conditions		80.2	19.8	<0.001
Traumatic life events	None	93.3	6.8	<0.001
	1-2	89.8	10.2	
	3-4	88.3	11.7	
	>5	84.3	15.7	
Life threatening accident	Ever	87.6	12.5	0.106
	Motor vehicle accident	87.5	12.5	0.138
	Other accident	87.9	12.1	0.466
Beaten badly	Ever	90.4	9.7	0.697
	As child, by caregivers	92.1	7.9	0.353
	By spouse	83.2	16.8	0.004
	By other	95.4	4.6	0.042

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Appendix 8: Description of sample prevalence stratified by chronic back/neck pain (row percentages)

Demographic characteristics	Categories	No chronic back/neck pain	Chronic back/neck pain	P-value
Age in years %	18-29	83.4	16.6	<0.001
	30-39	75.5	24.5	
	40-49	68.0	32.0	
	50-59	61.3	38.7	
	60+	54.3	45.7	
Sex	Female	68.7	31.3	<0.001
	Male	79.5	20.5	
Race	Black	73.3	26.7	0.121
	Coloured	72.5	27.5	
	White	79.7	20.3	
	Indian/ Asian	69.7	30.3	
Marital Status	Currently married	69.3	30.7	<0.001
	Currently unmarried	78.1	21.9	
Location	Urban	74.0	26.0	0.740
	Rural	73.3	26.7	
Education	None	58.0	42.0	<0.001
	Grade 1-7	62.3	37.7	
	Grade 8-11	75.4	24.6	
	Matric	82.5	17.5	
	Matric+	78.4	21.6	
Employment status	Currently employed	75.8	24.2	0.086
	Currently unemployed	72.7	27.3	
Family Income	None	72.3	27.7	0.092
	R1-5000	70.5	29.5	
	R5001-25 000	75.4	24.6	
	R25 001 -100 000	75.5	24.5	
	R100 000+	76.2	23.8	
Asset Index	None-5	71.8	28.2	0.043
	6-12	73.4	26.6	
	13-17	77.3	22.7	
Socioeconomic status	Low	64.4	35.7	<0.001
	Moderate	77.6	22.4	
	High	77.9	22.1	
Arthritis/rheumatism		31.9	68.1	<0.001
Other chronic pain		55.2	44.8	<0.001
Other chronic medical conditions		56.9	43.1	<0.001
Traumatic life events	None	83.6	16.4	<0.001
	1-2	73.0	27.0	
	3-4	65.2	34.8	
	>5	62.8	37.2	
Life threatening accident	Ever	68.7	31.3	0.009
	Motor vehicle accident	67.9	32.1	0.011
	Other accident	71.5	28.5	0.533
Beaten badly	Ever	71.3	28.7	0.275
	As child, by caregivers	73.5	26.5	0.940
	By spouse	60.9	39.1	<0.001
	By other	79.2	20.8	0.262

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