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Psychosocial interventions in rheumatoid arthritis: A patient centred approach using imagery and hypnotherapy

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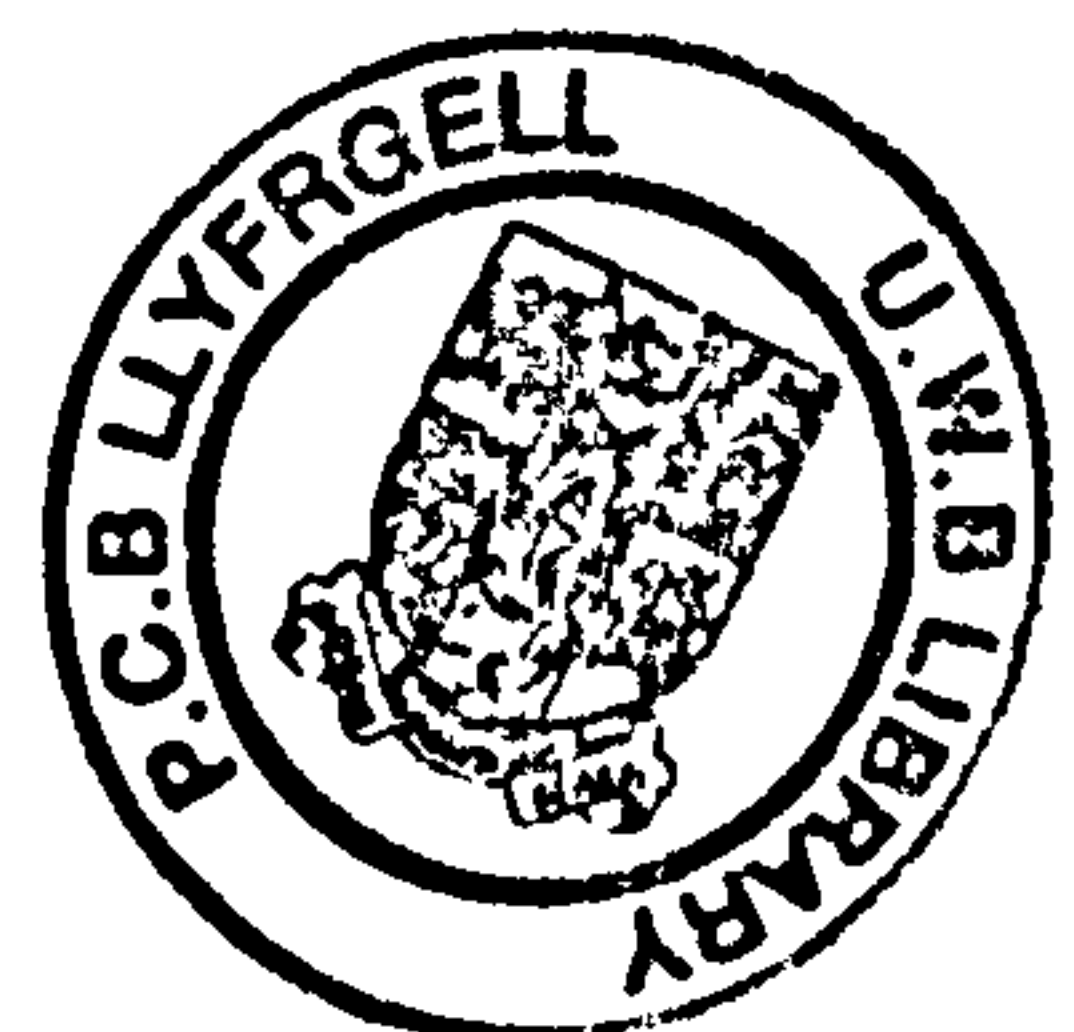
**PSYCHOSOCIAL INTERVENTIONS IN
RHEUMATOID ARTHRITIS:
A PATIENT CENTRED APPROACH USING
IMAGERY AND HYPNOTHERAPY**

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**Thesis submitted to Bangor University, Wales in fulfilment of the requirements of
the Degree of Doctor of Philosophy at Bangor University, Wales**

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SUMMARY

This thesis is written as a collection of research papers through which the therapeutic effects of imagery and hypnotherapy in rheumatoid arthritis (RA) are investigated using a patient-centred approach. The first section of this thesis explores the biomedical model of disease in RA, highlighting the limitations of this model which led to the development of a biopsychosocial model. Specifically, the biopsychosocial model of disease in RA identifies factors other than pathology which influence the symptoms associated with the disease, e.g., self-efficacy and social support. With a view that psychosocial variables can have an impact for the outcome in RA, a variety of psychosocial interventions have been utilised. Consequently, chapter two reviews the literature on psychosocial interventions and provides the rationale for further investigation of imagery and hypnotherapy. The second section of this thesis examines the application of these two psychosocial interventions using a patient-centred approach in RA patients. Patient-centredness was achieved by allowing participants to identify areas for therapeutic intervention using a patient generated outcome measure (PGOM). Specifically, chapter three identified that both imagery and hypnotherapy significantly increase health related quality of life (HRQOL) when measured with a PGOM of HRQOL in the short-term. However, only hypnotherapy maintained this significant increase in the long-term. Furthermore, a discrepancy between the most commonly used HRQOL measure (the SF-36) and a PGOM was identified, indicating that the SF-36 may not be measuring what is perceived to be HRQOL in individuals with RA. Using the same participants, chapter four identifies that both imagery and hypnotherapy significantly reduce pain in RA in the short-term. Additionally, hypnotherapy significantly increased self-efficacy for controlling pain, and significantly reduced functional disability. Given these results it was concluded that hypnotherapy was statistically superior to imagery. Consequently, as these psychosocial interventions provided some benefit to patients with stable RA, chapter five explored their use in active RA patients. Specifically, the biopsychosocial model assumes a reciprocal relationship between the three systems in the model. Using a case study approach several areas of improvement in clinical assessment were identified, with the disease activity score (DAS28) of two patients receiving hypnotherapy and four receiving imagery, showing a moderate response to the intervention in accordance with the European League Against Rheumatism (EULAR) response criteria. Additionally, participants reported improvement in psychosocial function with clinically significant reductions in pain and fatigue in some cases, and clinically significant reductions in functional disability in all ten participants. As the imagery group reported more clinically significant change it was concluded that this intervention was clinically more superior to hypnotherapy. The final section addresses methodological issues, the strengths and weakness of the research programme, future research directions and the clinical implications from the results of this thesis.

CHAPTER ONE

GENERAL INTRODUCTION

Objectives of the Research Programme

Throughout the medical literature there is evidence that the predominant disease pattern in developed countries is chronic rather than acute disease (Petri & Revenson, 2005). Within-disease variation indicates that factors other than underlying pathology and biology may be responsible for differences in the way in which chronic disease impacts the life of patients (Stanton & Revenson, 2007). Rheumatoid arthritis (RA) is a chronic disease where a disease-disability discrepancy is evident (Barlow, Cullen, & Rowe, 2002). Psychosocial interventions have been developed for chronic disease for the purposes of helping individuals adjust to the disease, to alleviate or treat the symptoms of the disease, and/or as adjunctive care to help patients cope with traditional medical care (Nicassio, Meyerowitz, & Kerns, 2004). The primary objective of this research programme was to examine the effects of two psychosocial interventions, imagery and hypnotherapy, in RA patients, specifically with a focus on psychosocial functioning related to the symptoms of the disease and disease activity in active RA. A secondary objective of this research programme was to provide training in the research process, from inception of the research question to dissemination of research findings.

Rheumatoid Arthritis: The Disease and the Symptoms

Rheumatoid arthritis is a chronic autoimmune disease (Combe, 2007) involving progressive inflammation of the synovial tissue lining of the joints and destruction of articular cartilage (Dixon & Symmons, 2005). The disease is normally diagnosed following

clinical assessment revealing four or more of the seven criteria provided by American College of Rheumatology, which include morning stiffness lasting more than one hour, arthritis of three or more joint areas, arthritis of the hand joints, symmetric arthritis, rheumatoid nodules, the presence of serum rheumatoid factor in blood, and radiographic changes (Arnett et al., 1988). Furthermore, disease activity is often characterised by elevated acute phase reactants, namely erythrocyte sedimentation rate and C-reactive protein (Felson et al., 1995). Although more usually associated with the joints, RA can also affect many organ systems leading to premature mortality (Simon, Lipman, Allaire, Caudill-Slosberg, & Gill, 2002). It is estimated that RA affects 1% of the population where women are almost three times more likely than men to be diagnosed with this disease (Gabriel, 2001).

Symptoms associated with the disease, including swollen and tender joints (Lee & Weinblatt, 2001), and pain (Pollard, Choy, & Scott, 2005) result in varying degrees of disability (Griffiths, 2006) and diminished quality of life (Gordon, Smith, & Dhillon, 2007). RA is also associated with unpredictable acute painful flare-ups (Strahl, Kleinknecht, & Dinnel, 2000) which have been shown to cause further progressive joint damage, and increased pain anxiety (Zautra, Burleson, Matt, Roth, & Burrows, 1994).

Pain. Pain is a primary concern for patients with RA (Pollard et al., 2005). Indeed, Sokka, Krishnan, Häkkinen, and Hannonen (2003) report that patients with RA experience higher pain levels than the general population. Moreover, increased pain in RA is predictive of higher functional disability (Häkkinen et al., 2005). Pain has also been related to psychological health and social factors (Nagyova, Stewart, Macejova, van Dijk, & van den Heuvel, 2005). Specifically, individuals with chronic pain may avoid certain activities which they believe would aggravate their pain. As a result they engage less in social activities and this has a negative impact on their social support networks (Evers, Kraaimaat, Geenen, Jacobs, & Bijlsma, 2003).

Despite pain being a symptom of the disease, there is evidence to suggest that non-disease factors influence the perception and severity of pain in RA (Dixon, Keefe, Scipio, Perri, & Abernethy, 2007). For example, Evers, Kraaimaat, van Riel, and Bijlsma (2001) reported that physiological and psychological reactions to pain influence future pain perceptions and pain behaviours (e.g. avoidance behaviours). Hamilton, Zutra, and Reich (2005) report that active coping, specifically, the expression of emotion and feeling in control of the pain, results in decreased self-reported pain in RA. More recently, Connelly et al. (2007) provide evidence which supports Hamilton et al. (2005), suggesting that 28% of the variance in pain can be explained by the regulation of both positive and negative affect. In relation to negative affect, Zautra et al. (2007a) have demonstrated that previous episodes of depression result in higher perceived pain.

Fatigue. Fatigue is a common symptom present in RA patients (Wolfe, Hawley, & Wilson, 1996). Indeed, patients with RA report fatigue as a major negative influence on their quality of life (Rupp, Boshuizen, Jacobi, Dinant, & van den Bos, 2004). It has been suggested that fatigue in RA may be due to increased pro-inflammatory cytokines which are known to be a contributing factor in increased fatigue in the healthy populations (Kelley et al., 2003). However, when investigating possible predictors of fatigue in RA patients, Huyser et al. (1998) found no significant correlations between disease activity, or biological indices of disease activity, and self-reported fatigue. This indicates that factors other than pathology may be responsible for increased fatigue in RA patients.

More recently, Zautra, Fasman, Parrish, and Davis (2007b) identified a positive correlation between lower affect and higher fatigue levels in RA. However the authors did not examine the influence of disease activity or inflammation. Furthermore, as the authors used a correlation approach in their analysis it is impossible to imply a causal relationship

between affect and fatigue. Therefore the results only suggest a relationship between the variables.

Pollard, Choy, Gonzalez, Khoshaba, and Scott (2006) examined the relationship between disease activity and fatigue in RA patients. Specifically, they identified three variables which could account for 53% of the variation in fatigue scores. These were pain, mental health, and the patient's global assessment of disease. Furthermore, they found no association between elevated inflammatory markers or disease activity and levels of fatigue. In support of these findings Repping-Wuts, Fransen, van Achterberg, Bleijenberg, and van Riel (2007) concluded that neither elevated biological markers of inflammation nor increased disease activity was significantly related to fatigue levels in RA.

Functional disability. Functional disability has been identified as the most important long-term outcome in RA (Lillegraven & Kvien, 2007). It has been defined as an individual's ability to function at many different levels, including person, societal, and environmental (Leonardi, Bickenbach, Ustun, Kostanjsek, & Chatterji, 2006). Sokka, Kautiainen, Hannonen, and Pincus (2006) identified, from a longitudinal study, that patients with RA are significantly more disabled than the general population. However, the authors noted that individuals over the age of 70 years were not significantly more disabled than aged-matched controls. If functional disability was a consequence of RA then we might expect that disability scores would be significantly higher in RA patients irrespective of age. This indicates that functional disability in RA is not only a result of disease.

Early studies investigating the determinants of disability in RA suggested that disability was the result of not only disease activity, but also psychological factors such as depression and anxiety (McFarlane & Brooks, 1988). However, current evidence indicates that disease activity is the most predictive variable of disability in RA (Scott, Smith, &

Kingsley, 2003), specifically, disease activity can explain 51% of functional disability (Haze, 2003).

Health related quality of life (HRQOL). Currently as there is no cure for RA, greater emphasis has been put on evaluating patients HRQOL (Fayers & Machin, 2000). HRQOL is defined as that part of overall quality of life affected by health (Moriarty, Zack, & Kobau, 2003) and includes an individual's perception of life satisfaction in relation to treatment of illness or disease (Kushida et al., 2007). Given the severity of the symptoms of RA, it is not surprising that studies investigating HRQOL report that patients with RA score lower on HRQOL measures than matched controls (Husted, Gladman, Farewell, & Cook, 2001). Uhlig, Loge, Kristiansen, and Kvien (2007) report that RA has a serious impact on physical health, but also affects all HRQOL domains, as measured by the Short Form 36 Health Survey Questionnaire (SF-36; Ware & Sherbourne, 1992). In a review of HRQOL in RA Groessl, Ganiats, and Sarkin (2006) identified several non-disease factors which contributed to differences in HRQOL in patients. Specifically, the authors noted that age, gender, education, and socio-economic status could account for differences, and were predictors of lower HRQOL.

The SF-36 is the most widely used HRQOL measure in RA studies (Kalyoncu, Dougados, Daures, & Gossec, 2008), however there is some evidence to suggest that this measure may not be an adequate measure of HRQOL in chronic conditions such as RA (Bradley et al., 1999). Furthermore, measures of HRQOL such as the SF-36 have been criticised because they fail to include the patient's perspective (Patel, Veenstra, & Patrick, 2003). Issues related to the measurement of HRQOL in RA are addressed within chapter three of this research thesis. In particular the use of generic and individualised measures is discussed in relation to patient perceived HRQOL.

In summary, the symptoms associated with RA are detrimental to the individual. Patients experience high levels of pain and fatigue, functional disability, and decreased HRQOL. However, the literature indicates that the severity of the symptoms is not the result of the disease alone. Several psychological, social and environmental influences can be identified which contribute to the consequences of living with RA. Notwithstanding the non-disease specific factors associated with the symptoms of RA, the disease and treatment has traditionally been conceptualised within a biomedical model (Escalante & del Rincon, 2002).

A Biomedical Perspective of the Disease and Treatment

A biomedical perspective of disease in RA assumes that the symptoms and outcomes of the disease are determined by the underlying pathology and physiological mechanisms related to the disease (Abelson, Rupel, & Pincus, 2008). However, as cited in the previous section, there are many non-disease factors which influence the symptoms of this disease. More importantly, a challenge for the biomedical model is that the exact cause of RA remains unclear (Haas et al., 2006; Smolen, Aletha, Koeller, Weisman, & Emery, 2007). Much is known about the immune response and inflammatory processes in RA (Albert & Inman, 1999; Edwards & Cambridge, 2006; McInnes & Schett, 2007) and possible risk factors associated with the aetiology of the disease have also been identified (Stolt et al., 2003). However, there is currently no cure for RA (Newman & Milligan, 2004), consequently the aim of treatment, from a biomedical perspective, is to control disease progression and disability through pharmaceutical intervention using non-steroidal anti-inflammatory drugs (NSAIDs) and disease modifying anti-rheumatic drugs (DMARDs).

Pharmacological intervention using NSAIDs. NSAIDs, for example aspirin, ibuprofen, diclofenac, and naproxen, are used routinely in RA patients. NSAIDs act almost immediately on pain and inflammation in RA patients, however these drugs generally do not

alter the course of disease progression (Combe, 2007). They were once considered the first course of treatment, often being used conservatively for a number of years before introducing DMARDs (Lee et al., 2001). However due to the high risks associated with these drugs, for example acute myocardial infarction (Singh, Wu, Langhorne, & Madhok, 2006), gastrointestinal ulceration (Moore, Derry, Makinson, & McQuay, 2005), and acute renal failure (Griffin, Yared, & Ray, 2000), it is now advised that patients should use NSAID for the shortest duration possible (Singh et al., 2003).

Pharmacological intervention using DMARDs. DMARDs, for example methotrexate, sulphasalazine, and cyclosporine, or combinations of DMARDs have shown to effectively slow the progression of RA (Landewe et al., 2000; Goekoop-Ruiterman et al., 2002).

DMARDs are not as fast acting as NSAIDs often taking several months before they have an impact on disease progression (Combe, 2007). Evidence further suggests that earlier intervention is most effective in order to reduce further joint damage and disability (Nell et al., 2004), and that delayed introduction of DMARDs is associated with greater problems in controlling the disease (Möttönen et al., 2002).

The problem of a biomedical approach to the treatment of RA. Identifying early disease is extremely difficult for clinicians as there are no diagnostic criteria or tests available to define early RA (Visser, 2005). Furthermore, many patients delay seeking medical help believing that their symptoms are a result of a preceding activity, for example over-doing things with the shopping, or DIY (Sheppard, Kumar, Buckley, Shaw, & Raza, 2008).

Additionally, not only do patients delay seeking medical attention, but there is a further delay between first encounter with a physician and subsequent follow-up with a rheumatology specialist (Feldman et al., 2007; Kumar et al., 2007). Indeed Palm and Purinszky (2005) noted that many patients face a 16 week delay before being seen by a rheumatology specialist. As delayed introduction of DMARD therapy has been associated with greater

problems in controlling the disease many patients who experience these delays may have to try several DMARDs before the most effective treatment regime is obtained (Choy, Smith, Doré, & Scott, 2005). Furthermore, adherence to anti-rheumatic medications is often low. Indeed, De Klerk et al. (2003) estimate that RA patient adherence with drug treatment is between 30 and 80%, and increases during a flare.

More recently, biological agents have proven effective at reducing disease activity in RA (Emery, 2006). Randomised clinical trials of anti-tumour necrosis factor α (anti-TNF- α) have demonstrated effectiveness for reducing functional decline and joint erosion in patients who did not respond to traditional DMARD therapy (Breedveld et al., 2006). These new developments in the treatment of RA prove promising. However as with established drug treatment of RA, anti-TNF- α also carries considerable risks. For example, the risk of serious infections such as pneumonia is doubled when compared to traditional DMARD therapy (Iancu & Direskeneli, 2006), and increased risk of neurological disease such as multiple sclerosis and optic neuritis have also been indicated (Park & Park, 2006). Additionally, biological treatments for RA are very expensive (Smolen et al., 2007), and there is uncertainty about their cost-effectiveness (Barbieri et al., 2007).

The biomedical model of disability in RA. Disability is a long-term outcome of RA (Cieza & Stucki, 2005). In order to understand the process of disability several conceptual models have been developed, for example Disease Handicap Model (WHO, 1980) and the Disease Disability Model (Nagi, 1991). Similarly, Verbrugge and Jette (1994) propose a model which focuses on the sequence of events from pathology to disability. They propose that inflammation from RA causes impairment, for example, swelling, deformity, and pain. The impairment caused by the pathology leads to functional limitations, for example loss of mobility, loss of strength, and loss of dexterity. Finally, they suggest that functional limitation leads to disability, for example being unable to clean the house, or do the shopping.

However, these models of disability have been criticised for the linear fashion they portray the progression of disability in RA (Jette & Keysor, 2003). Furthermore, researchers using these models have identified variables not directly related to pathology, or impairment, which may exacerbate, or reduce disability (Foster et al., 2003; Trilling, 2000). Specifically, Escalante and del Rincon (1999) identified that the main disease-disability model proposed by Verbrugge et al. (1994) could only account for 33% of the overall disability in RA. More recently, Walker, Littlejohn, Jackson, and Dudgeon (2005) demonstrated that the biomedical model could only account for 39% of the variance in activities of daily living. These results support the findings of Escalante et al. (1999) and provide evidence of the limitations of a biomedical model of disease and disability in RA.

The biomedical model of disease and disability in RA has provided many opportunities to understand the pathology and possible underlying mechanisms associated with disease progression. A biomedical approach to treatment has also been instrumental in the development of new and exciting drug therapies which help to alleviate some of the symptoms and the resultant disability associated with the disease. However, given that the biomedical model cannot fully account for disability in RA, this indicates limitations of this particular theoretical orientation. Specifically, the biomedical model does not consider psychological or social factors. Furthermore, clinical evidence of the limitations of a biomedical model is provided by the fact that patients of the same age can present with very similar clinical measures of disease activity, yet have very different degrees of disability (Barlow et al., 2002) in RA. The discrepancy between disease and disability has fuelled researchers exploring a biopsychosocial model of disease in RA.

A Biopsychosocial Perspective of the Disease and Treatment

The biopsychosocial model is a general model derived from social cognitive theory (Halligan & Aylward, 2006). DiMatteo, Haskard, and Williams (2007) argue that the main premise of the biopsychosocial model is that disease and illness are considered within the context of three systems, namely biology (e.g., genetics, pathology, immunology), psychology (e.g., cognition, emotion, and behaviour), and social (e.g., social and physical environments). Furthermore, it is assumed that the three systems in the model have a reciprocal relationship, where changes in one system can influence changes in the others (Keefe et al., 2002). For example, within RA a biopsychosocial model we might hypothesise that increases in the number of swollen joints and elevated inflammatory markers (the biology subsystem) would lead to increased pain, anxiety, and decreased self-efficacy (the psychology subsystem), which may result in a decrease in the amount of time spent in leisure activities (the social subsystem).

It is clear that the biomedical model of disease and disability in RA concentrates almost exclusively on biological, genetic, and pathological influences, and does not acknowledge non-disease specific factors such as demographic characteristics and psychosocial variables which may contribute towards overall outcome of the disease (Foster et al., 2003). These non-disease specific factors are central to the biopsychosocial model of disease and disability in RA. Specifically, Escalante et al. (2002) propose that contextual factors and psychosocial modifiers can influence the main disease-disability pathway and resultant disability.

Contextual Factors in the Development of Disability in RA

Although contextual factors help to inform a biopsychosocial model of disability in RA they are generally not amenable to change (Escalante et al., 2002), and include variables such as biological sex, and socioeconomic status.

Biological sex. Studies that investigate the differences in disability between men and women often report that women with RA are more disabled than men with RA (Symmons, 2003). Indeed, Soroosh et al. (2005) identified that pain and disability were consistently rated worse in women than men, even though there were no significant differences in joint deformity or disease activity. The evidence might seem to indicate that RA affects women more than men. However, early studies have shown that men with RA over estimate their functional capabilities (Van den Ende, Hazes, Le Cessie, Breedveld, & Dijkmans, 1995). Therefore, at present it is unclear whether biological sex plays any significant role in disability however, there is evidence that the onset of RA in males is significantly later than females (Wilder, 1996). This has prompted novel research investigating the role of sex-hormones in the aetiology of RA (Jawaheer, Lum, Gregersen, & Criswell, 2006).

Socioeconomic status. Early studies linked lower socioeconomic status to increased disease severity and morbidity in RA patients from the US (Callahan & Pincus, 1988). It was suggested that inadequate access to medical care was a crucial mechanism in explaining this finding. However in the UK, where medical care is provided free by the National Health Service (NHS), NHS patients with lower socioeconomic status also experience higher disability and mortality rates than those NHS patients with higher socioeconomic status (Maiden, Capell, Madhok, Hampson & Thomspn, 1999). This is inconsistent with the proposed explanations of Callahan et al. (1988). Research has also demonstrated that compliance to medication is not a significant factor in explaining socioeconomic differences

in RA patients (McEntegart et al., 1997). More recently, Bengtsson, Nordmark, Klareskog, Lundberg, and Alfredsson (2005) reported that individuals with lower socioeconomic status have a higher risk of developing RA, and conclude that unexplained environmental, or lifestyle factors are a risk factor in RA. It is clear from the literature that lower socioeconomic status is not only a risk factor of RA, but also has a greater impact on disease severity and increased mortality by unknown mechanisms.

Other contextual factors. Other contextual factors identified by Escalante et al. (2002) include age and ethnic background. However, as with biological sex and socioeconomic status, the mechanism by which they influence susceptibility and severity of disease is not clearly understood. These contextual factors are not considered by the biomedical model of disease and disability in RA, but the evidence presented does suggest they do account for some of the variance in disability. However, the amount of variance contextual factors contribute to disability is relatively low. Using hierarchical regression analysis Escalante et al. (2002) calculated that contextual factors could account for 6% of the variance in disability in RA. Other variables within the biopsychosocial model which further develop our understanding of the variance in disease and disability in RA include environmental and lifestyle factors, and psychosocial modifiers (Escalante et al., 2002).

Psychosocial Modifiers in Rheumatoid Arthritis

Psychological modifiers are variables which may influence the symptoms of RA, but are not directly related to the disease (Escalante et al., 2002). A number of psychological modifiers have been identified in RA. For example, Schoenfield-Smith et al. (1996) identified pain and feelings of helplessness as psychosocial modifiers in the development of disability in RA. Helplessness can occur when individuals perceive no control over the outcome of their disease (Smith, Peck, & Ward, 1990), this is particularly salient for individuals with RA

where the occurrence of flares is unpredictable and severe (Strahl et al., 2000). Indeed, helplessness has been shown to be a significant predictor of pain, disability, and depression in chronic pain patients including RA (Samwel, Evers, Crul, & Kraaimaat, 2006).

Psychological stress has also demonstrated a modifying effect in adjustment to RA and consequent health status (Curtis, Groarke, Coughlan, and Gsel, 2005). Zautra and Smith (2001) demonstrated that compared to people with osteoarthritis, individuals with RA have higher physiological and psychological reactivity to stress. Importantly, increased stress has shown to elevate the inflammatory marker C-reactive protein in RA, indicating increased disease activity (Zautra, Smith, & Yocum, 2002).

Psychosocial modifiers, specifically, self-efficacy, and social support have been identified as important in the disablement process and health related quality of life in RA (Keefe et al., 2002; Newman & Mulligan, 2004). Pain is also considered a psychosocial modifier in the disablement process in RA, however as this was discussed earlier in this chapter it will not be repeated here.

Self-efficacy. The construct of self-efficacy is a central component of Bandura's (1977) social cognitive theory. Briefly, self-efficacy is an individual's belief in their ability to successfully organise and carry out a specific course of action to attain the desired result (Bandura, 1977). Early studies indicate that higher levels of self-efficacy in RA patients resulted in better psychological health (Lorig, Chastain, Ung, Shoor, & Holman, 1989) and lower levels of disability (Shoor & Holman, 1984). Indeed, Riemsma et al. (1998) identified that 37% of the variance for fatigue could be explained by self-efficacy and pain. Specifically, pain has a direct influence on psychological and functional disability (Schoenfield-Smith et al., 1996).

In patients with RA where self-efficacy for managing pain is high, then there is a possibility that perceived disability will be lower. Indeed, in a large sample of RA patients Brekke, Hjortdahl, and Kvien (2001) demonstrated that higher scores in self-efficacy for managing pain was significantly correlated with lower scores in pain, fatigue, patients global assessment of disease severity and increased mental health over a two year period. More recently, Cross, March, Lapsley, Byrne, and Brooks (2006) provided similar evidence, with significant correlations between higher scores on self-efficacy measures and better health status in RA patients. Although the results from these studies indicate a potential moderating role of self-efficacy in RA, it should be remembered that the analyses used in these studies was correlational, therefore it is impossible to suggest causation. It may be that self-efficacy for controlling pain was higher because perceived pain was lower. Longitudinal prospective studies would provide evidence on the direction of causality between self-efficacy and the outcome of symptoms associated with RA.

Social support. Social support has been defined as “the degree to which a persons needs are gratified through interaction with others, these needs may be met by either the provision of socio-emotional aid or the provision of instrumental aid” (Thoits, 1982, p. 147). Early studies investigating the role of social support in RA patients have provided some evidence that social support influences not only the outcomes of the disease but also disease activity. For example, Guccione, Anderson, Anthony, and Meenan (1995) reported that patients who were married had slower disease progression rates than those who were single. Newman, Fitzpatrick, Lamb, and Shipley (1989) identified that patients with a greater number of social contacts had better psychological health.

These two early studies raise important questions regarding the nature of social support. There are assumptions that social support is a positive factor, and that quantity may be better than quality and satisfaction of support transactions. In relation to the quality of

social support, research investigating married couples has identified that where the spouse of the patient is critical then this has a negative effect on psychological health (Kraaimaat, van Dam-Baggen, & Bijlsma, 1995).

The results of more recent studies investigating social support as a psychosocial modifier in RA confirm the findings of earlier studies. Evers et al. (2003) reported that greater social support predicted lower functional disability and pain at three years follow-up and still remained a significant predictor after five years. However, a limitation of this study was participants low disease duration, less than one year. Given the improvement in aggressive treatment of early RA it is possible that the beneficial changes may not be due to social support, but may be due to the medication. Indeed, Strating, Suurmeijer, and Van Schuur (2006) found that although social support seems to buffer the impact of early RA, there was no effect for patients with long-standing RA. Suggesting that possibly there are other variables not measured in these studies which contribute to improve functional abilities, for example anti-rheumatic medication. However, in a study examining RA patients with a mean disease duration of 13 years (ranged between less than one year and 43 years), Zyrianova et al. (2006) investigated the possible buffering effects of social support on depression and anxiety in RA patients. The authors reported that scores on measures of depression and anxiety were highly correlated with pain and functional disability. More importantly, perceived social support was found to be a significant predictor of both depression and anxiety. This study suggests that social support may have a beneficial buffering effect in RA irrespective of disease duration.

In summary, the symptoms of RA cannot be fully explained by the biomedical model. Factors specific to the individual person such as contextual and psychosocial variables contribute to the symptoms of RA including resultant disability. Contextual variables are generally not possible to change, however many of the symptoms of the disease can be modified

by psychosocial factors such as self-efficacy, psychological health, and social support. Given that the symptoms of RA can be modified by psychosocial variables, research within a biopsychosocial perspective has focussed on psychosocial interventions to help alleviate the symptoms of the disease. Consequently, an objective of the present research programme was to examine the effect specific psychosocial interventions in patients with RA in order to examine changes in the symptoms associated with the disease.

A Patient-Centred Approach as an Outcome of a Biopsychosocial Perspective

The transition from a biomedical to a biopsychosocial perspective of disease raises a number of important issues regarding the management and delivery of treatment for chronic diseases such as RA. Indeed, within the UK, the NHS has adopted a new strategy in creating a patient-led NHS, giving patients greater choice and control of treatment (Department of Health, 2005). This strategy reflects the growing awareness of the changing roles of patients as service users and physicians as service providers, the need for increased satisfaction in service provision, and a change in focus from disease to understanding the patient's perspective (Epstein et al., 2005). It has been acknowledged that the focus from the disease to the person integrates a patient-centred focus, rather than a physician-centred, or disease-centred focus (Silverman, 1987; Stewart, 2001).

Several models of patient-centredness have been proposed (Brown, Stewart, & Ryan, 2001; Stewart et al., 1995; Epstein et al., 2005). These models differ on what constitutes a patient-centred approach, largely due to different definitions, for example Epstein et al., (2005) argue that communication between the patient and the physician is a key determinant in developing a patient-centred approach, while Brown et al. (2001) propose that sharing power and responsibility are important elements of patient-centredness. However, the essential focus of all models of patient-centredness is the role of psychological and social

factors which interact with the biological factors, i.e. the biopsychosocial model of disease (Del Piccolo, Mazzi, Scardoni, Gobbi, & Zimmermann, 2008).

Within research and clinical practice, patient-centredness is further enhanced through the use of patient reported outcome measures (PROMs; Carr & Higginson, 2001) and patient generated outcome measures (PGOMs; Patel et al., 2003). PROMs are instruments that measure any aspect of a person's health that come directly from the patient (Marshall, Haywood, & Fitzpatrick, 2006). Examples of PROMs used routinely in research and clinical practice include visual analogue scale for pain and fatigue, and fixed-item measures such as the hospital anxiety and depression scale (Zigmond & Snaith, 1983) and the Short Form 36 Health Survey Questionnaire (SF-36; Ware et al., 1992). PGOMs are different from PROMs in that patients identify specific areas of their life which are important to them, rather than pre-selected items thought to be important by clinicians (Carr et al., 2001). Examples of PGOMs include the Patient Generated Index (PGI; Ruta, Garratt, Leng, Russell, & MacDonald, 1994) and the Schedule for the Evaluation of Individual Quality of Life (SEIQoL; O'Boyle, Browne, Hickey, McGee, & Joyce, 1995).

The use of such measures as outcomes in research and clinical practice facilitate improved patient-clinician communication (Gilbody, Whitty, Grimshaw, & Thomas, 2003). Furthermore, PROMs and PGOMs can be used to identify patient preferences enabling shared power and responsibility for goals of treatment (Lindblad, Ring, Glimelius, & Hansson, 2002). Furthermore, the use of PROMs and PGOMs to facilitate a patient-centred approach to treatment may result in greater satisfaction with healthcare (Hirsh et al., 2005) and increases compliance to treatment (Fuertes et al., 2007).

In summary, the primary aim of a biomedical perspective in chronic disease, the diagnosis and subsequent treatment, is dictated by pharmacological intervention to restore the

underlying biological mechanism to a state of normality (Mead & Bower, 2000). This emphasises a disease-centred approach. The biopsychosocial perspective of disease focuses more on the individual and reflects a patient-centred approach (Stewart, 2001). Furthermore, the use of PROMs and PGOMs in research and clinical practice help to reinforce a patient-centred approach in the treatment of chronic disease. Consequently, within the current research programme both PROMs and PGOMs were utilised to ensure a patient-centred approach was possible.

Overview of the Research Programme

This research programme aims to investigate psychosocial interventions in RA. A patient-centred approach will be utilised by employing PROMs and, more specifically the PGI, a PGOM. However, in determining which psychosocial interventions will be employed it is necessary to conduct a review of the literature of psychosocial interventions in RA. This review will identify which psychosocial interventions warrant further investigation. Consequently, chapter two of this research thesis will provide a literature review of psychosocial interventions in RA.

An important outcome of any intervention in chronic disease is HRQOL as this will help direct the management of the disease (Fayers & Machin, 2000). Consequently, chapter three of this thesis will focus on the measurement of HRQOL in RA, following a psychosocial intervention identified in chapter two. Specifically, a HRQOL PGOM will be compared to a HRQOL PROM.

Chapter four of this thesis will examine the efficacy of the chosen psychosocial intervention with regard to the symptoms of RA (e.g. pain, fatigue, pain anxiety, self-efficacy, and functional disability). Chapter five will focus on the assumptions of a biopsychosocial model of RA and examine whether changes in the psychology subsystem of

this model results in any beneficial change to the biology of the disease following psychosocial intervention.

The final chapter of this thesis will provide overall conclusions concerning the efficacy of the psychosocial interventions employed in the research programme. The strengths and limitations of the current research will be identified, through which areas for future research and the clinical implications of this research programme will also be addressed. In concluding this research thesis the mnemonic *FINER*, suggested by Hartrick (2008) for aiding systematic reflection of the research process will be employed. Specifically, Hartrick (2008) argues that high quality studies should be feasible, interesting, novel, ethical, and relevant.

CHAPTER TWO

PSYCHOSOCIAL INTERVENTIONS FOR RHEUMATOID ARTHRITIS: A REVIEW OF THE LITERATURE.

The objective of this chapter is to identify the psychosocial interventions which will be employed throughout the research programme. The term 'psychosocial intervention' is an umbrella term which covers a broad spectrum of psychological interventions (Astin, Shapiro, Eisenberg, & Forys, 2003). Indeed, Astin et al. (2003) note that interrelated terms include 'behavioural', 'psycho-educational', and 'mind-body therapy' and simply reflect the theoretical orientations of the investigators. For simplicity, unless stated otherwise the term 'psychosocial intervention' will be used throughout this chapter. Psychosocial interventions commonly employed in RA studies include relaxation techniques, meditation, biofeedback, cognitive behavioural therapy, educational programmes, imagery, and hypnotherapy, (Astin et al., 2003; Wolsko, Eisenberg, Davis, & Phillips, 2004).

Although meta-analyses are considered the optimum statistical procedure for testing assumptions about the efficacy of treatments in medicine (Glass, 1976) visual inspection of the available data highlighted some limitations in conducting a meta-analysis. The interventions employed in the studies that were identified were heterogeneous in the design and administration and were multimodal. For example one study employed education and information about exercise with a relaxation intervention (Lord, Victor, Littlejohns, Ross, & Axford, 1999), yet in other study coping skills training and imagery techniques were combined with relaxation (Radojevic, Nicassio, & Weisman, 1992). It is the opinion of the present author that conducting a meta-analysis on studies where the interventions are so different would render the effect size meaningless. Therefore a review of the literature is presented.

In order to review published studies of psychosocial interventions utilised in rheumatoid arthritis (RA) a search was performed in the electronic databases, MedLine, PsychArticles, and ScienceDirect. An advanced Boolean search option was chosen using the terms “rheumatoid arthritis” AND “psychosocial intervention”, or “relaxation”, or “meditation”, or “biofeedback”, or “cognitive behavioural therapy”, or “CBT”, or “psychoeducation”, or “patient education”, or “imagery”, or “guided imagery”, or hypnotherapy”, or “hypnosis” between 1980 and 2008. Only studies which used RA patients who were classed as adults, and were written in English were included.

In total 14 studies employing relaxation techniques (see table 1), two studies employing meditation, three studies employing biofeedback (see table 2), 18 studies employing cognitive behavioural therapy (see table 3), 14 studies employing educational approaches (see table 4), seven studies employing imagery (see table 5), and two studies employing hypnotherapy, were identified and included in the present review. Tables are presented in each of the sections below identifying (a) the first author and year of publication, (b) the design of the study, (c) whether any other therapeutic modality was included in the design, (d) the sample size in the study, (e) the type of control group used in the study, (f) the duration of the intervention, (g) whether the intervention was administered in a group or individual setting, (h) the outcomes measured in the study, and (i) the results reported for the study.

Relaxation techniques. The goal of relaxation techniques is to achieve a state of reduced sympathetic arousal and /or reduced muscle tension (Hellman, Budd, Borysenko, McClelland, & Benson, 1990; McCaffery & Pasero, 1999). Several models have been proposed regarding the effects of relaxation. For example, Davidson and Schwartz (1976) propose that the beneficial effects of relaxation are due to specific effects. That is, relaxation aimed at reducing muscular stress will have that specific effect and no other effects.

However, Benson (1983) argues that there is a single relaxation response which may have a number of beneficial effects, rather than one specific effect. Studies employing relaxation as a therapeutic intervention have shown significant positive effects in chronic conditions such as anxiety (Rasid & Parish, 1998), panic disorders (Oest & Westling, 1995), and headaches (Primavera & Kaiser, 1992).

More specifically, the use of relaxation as a psychosocial intervention in the adjunct treatment of RA (see table 1) has shown significant decreases in anxiety (Bagheri-Nesami, Mohseni-Bandpei, & Shayesteh-Azar, 2006; Leibling, Pfingsten, Bartmann, Rueger, & Schuessler, 1999), depression (Bagheri-Nesami et al., 2006; Radojevic, Nicassio, & Weisman, 1992; Sharpe et al., 2001), pain (Achterberg, McGraw, & Lawlis, 1981; Fries, Carey, & McShane, 1997; Keefe et al., 1999; Leibling et al., 1999; Radojevic et al., 1992), and functional disability (Fries et al., 1997; Keefe et al., 1999; Lundgren & Stenstrom, 1999; Taal, Riemsma, Brus, & Seydel, 1993). Only one study found significant effects for relaxation with regard to decreased morning stiffness (Bagheri-Nesami et al., 2006), one study reported significantly reduced tender joints (Fries et al., 1997), and one other study reported significantly increased self-efficacy to control pain (Taal et al., 1993).

Nine studies included a follow-up period in their design. Significant decreases in depression at six months follow-up was reported by one study (Sharpe et al., 2001), self-efficacy for controlling pain at 14 months follow-up was reported in one other (Taal et al., 1993). Five other studies where relaxation had previously demonstrated a significant effect at post-intervention were not significant at follow-up. Furthermore, five of the 14 studies reviewed reported no significant effects for relaxation at post-intervention or follow-up (Germond, Schomer, Meyers, & Weight, 1993; Kraaimaat, Brons, Geenen, & Bijlsma, 1995; Lord et al., 1999; Multon et al., 2001; Scholten et al., 1999).

Table 1. Summary of psychosocial interventions involving an element of relaxation for RA

First Author (year)	Design	Any other modality	Sample Size	Control	Intervention Duration	Individual or Group	Outcomes measured	Results
Achterberg (1981)	Randomised trial with no follow-up	Biofeedback	39	physiotherapy group	8 1hr sessions over 10 weeks	Individual	Pain, tension, sleep patterns, psychological well- being, physical function.	Significant decrease in pain and tension, improved sleep pattern observed with no significant differences between groups.
Bagheri- Nesami (2006)	RCT with no follow- up	-	50	Care as usual	20mins/week for 8 weeks	Individual	Anxiety, depression, psychological well- being, fatigue, painful and swollen joints, duration of morning stiffness, ESR, CRP, and Rheumatoid Factor (RF).	Relaxation group had significantly lower anxiety and depression, significantly improved psychological well- being, and significantly lower morning stiffness duration than control group at post-intervention.

Table 1. Relaxation interventions cont,

Fries (1997)	RCT with 6 months follow-up	education and exercise	809	Care as usual	Video	Individual	Swollen and tender joint, pain, physical functioning, quality of life, and hospital doctor visits.	Significantly lower tender joints and pain, improved function, increased quality of life, and significantly lower number of doctor visits at follow-up.
Germond (1993)	RCT with 8 week follow-up	Pain management training, coping skills, and NLP.	24	Care as usual	2hrs/week for 8 weeks	Group	Clinical assessment using Ritchie articular index, sedimentation rate (ESR), lymphocyte proliferation rate, pain, functional disability, and mood.	No significant differences between the groups in any outcomes.

Table 1. Relaxation interventions cont.

Keefe (1999)	Randomised trial with 6 and 12 month follow-up	Imagery and distraction, cognitive restructuring, and self-instructional methods for dealing with flares.	82	No control group. Group 1: spouse assisted coping skills, group 2: CBT involving imagery, group 3: group 2 plus spouse assisted coping skills	2 hours/week for 10 weeks	Group	Pain, functioning, and psychological well-being.	Group 3 reported significantly less pain than group 1, but only at post-intervention. Group 2 reported significantly better function than group 1 at 12 month follow-up. Group 3 reported less psychological disability than group 1 but only at post-intervention.
Kraaimaat (1995)	RCT with 3 and 12 month follow-up	CBT, coping with pain and stress.	77	Care as usual Wait list control	2hrs/week for 10 weeks	not reported	ESR, C-reactive protein (CRP), walking time and joint score.	No significant differences between any of the groups.
Leibing (1999)	RCT with no follow-up.	CBT (information), imagery, pain management, and coping skills.	55	Care as usual	1.5hrs/week for 12 weeks.	Group	Swollen joints, pain, functioning, depression, and anxiety.	Significant decrease in pain, depression and anxiety for intervention group.

Table 1. Relaxation interventions cont.

Lord (1999)	RCT with 1, 3, 6, and 12 months post-intervention.	Education and information about exercise.	126	Care as usual	1 hour/week for 4 weeks	Group	Pain, function, and psychological well-being.	No significant differences reported between the group in any of the outcomes
Lundgren (1999)	RCT with 6 and 12 month follow-up.	Imagery techniques.	60	Care as usual	30mins twice weekly for 10 weeks.	Not reported	Pain and functional disability.	Significant decrease in disability for intervention group, but only at 6 months follow-up.
Multon (2001)	RCT with 3 and 15 month follow-up.	CBT with coping skills training	128	Care as usual Attention control group (education)	1.5hrs/week for 10 weeks, additional sessions every 3 months for 15 months.	Individual	Pain behaviours.	No significant differences between any group.
Radojevic (1992)	RCT with 2 month follow-up	Coping skills and imagery techniques.	59	Care as usual Attention control (education, video presentations)	90mins/week for 6 weeks	Group	Pain, physical functioning, depression, swollen joint, and coping.	Intervention group reported significantly lower pain and depression at post-intervention, however not significant at follow-up.

Table 1. Relaxation interventions cont,

Scholten (1999)	RCT with 6 week and 12 month follow-up.	CBT programme including counselling.	64	Care as usual	9 sessions over two weeks with monthly meetings.	Group	Functioning, Protective behaviours, and depression.	No statistical differences between the groups, but trend for improvement in intervention group over time.
Sharpe (2001)	RCT with 6 months follow-up	CBT, problem solving, coping skills training, and management of flare-ups.	45	Care as usual	1 hour/week for 8 weeks	Individual	Clinical assessment using Ritchie articular index, pain, functional disability, depression, and anxiety.	Intervention group significantly improved clinical assessment at follow-up and significantly less depression at post-intervention and follow-up.
Taal (1993)	RCT with 4 and 14 month follow-up	Education, imagery and coping with depression group.	75	Care as usual	2hrs/week for 5 weeks	Group	Joint tenderness, ESR, depression, pain, anxiety, self-efficacy, and functional disability.	Intervention group reported significant decrease in functional disability, and increased self-efficacy at post-intervention. Self-efficacy remained significantly higher at 14 month follow-up.

Thirteen of the 14 studies identified which utilised relaxation as a psychosocial intervention reported combining this with at least one other modality. Specifically, eight studies combined relaxation with cognitive behavioural therapy, five included imagery, three included education, two included exercise, and one included biofeedback with relaxation. Therefore, the evidence for the effectiveness of relaxation as a psychosocial intervention in isolation from other modalities is extremely limited. Only one study employed relaxation as a singular therapeutic modality. The results of this study identified significant decreases in anxiety, depression, and duration of morning stiffness at post-intervention (Bagheri-Nesami et al., 2006). However, as there was no follow-up in the design of this study it is impossible to state any long-term benefits of relaxation as a singular mode of psychosocial intervention in RA.

In summary, relaxation interventions shown some evidence of improving the symptoms associated with RA in the short-term. The long-term benefit is inconclusive. A criticism of relaxation interventions is the multimodal nature of such interventions. Indeed, in a recent review specifically with regard to pain management in different musculoskeletal conditions, which included RA, Nicholas (2008) identified that relaxation techniques are rarely used in isolation. The evidence presented in the current review, specifically related to RA and the symptoms of the disease, indicates that relaxation as a multimodal adjunct may be effective. However there is no long-term evidence that this psychosocial intervention would be effective in isolation.

Meditation. The practice of meditation predates traditional medicine (Kabat-Zinn, 1982). Recently two specific forms of meditation have been employed as psychosocial interventions for chronic conditions, namely transcendental and mindfulness meditation (Morone & Greco, 2007). Transcendental meditation involves focussed attention, often achieved by repeating a word or phrase in a chant-like fashion (Goleman & Schwartz, 1976)

with the purpose of gaining conscious control over autonomic nervous system responses. Indeed, early studies have indicated that transcendental meditation can bring about a profound state of relaxation, specifically with reduced heart rate, respiration rate, and increased EEG alpha rhythms (Shapiro, 1995). Mindfulness meditation involves a moment to moment awareness of emotions, thoughts, and sensations (Kabat-Zinn, 1982). Mindfulness meditation has been utilised as a therapeutic modality in many trials of chronic pain, with the results of these studies indicating this to be effective with long term beneficial outcome (Kabat-Zinn, Lipworth, Burney, & Sellers, 1986). More recently, Sephton et al. (2007) reported significant reductions in depression in fibromyalgia patients following an eight week course of mindfulness meditation. Additionally, in a community based sample of patients with an eating disorder, Smith, et al. (2008) concluded that mindfulness meditation was more effective than cognitive behavioural therapy for reducing incidences of binge eating episodes.

Specifically, studies employing meditation as a psychosocial intervention with RA patients are very limited. Indeed, to the best of the present author's knowledge, only two studies exist in the literature investigating the possible therapeutic effects of this modality. Pradhan et al. (2007) assessed the benefits of mindfulness meditation on depressive symptoms, psychological well-being, and disease activity in a sample of 63 patients with RA. Following an eight week course with one 2.5 hours session of meditation a week, the authors reported that there were no significant differences between the groups in any of the outcomes measured. However, at six months follow-up there was a significant improvement in depressive symptoms and psychological distress observed in the intervention group and not in the controls. The authors also reported that the intervention had no impact on disease activity levels in their sample of RA patients. Although this initial study provides some evidence for mindfulness meditation as an effective psychosocial intervention for reducing depression and psychological distress in RA patients, there are some limitations to note. Although a care-as-

usual control group was included in the design of this study, the authors did not take into account possible experimenter effects which may confound their results. Specifically, changes in depression and psychological distress have shown to be associated with changes in levels of social support (Zyrianova et al., 2006).

Zautra et al. (2008) conducted a trial comparing the effectiveness of mindfulness based meditation to cognitive behavioural therapy. Forty seven patients completed an 8 week course of group sessions in mindfulness meditation, 44 completed a tailored cognitive therapy course lasting for the same duration as the mindfulness meditation group, and 40 participants who were randomised to an attention control group received an 8 week education course. The outcomes measured in this study included pain, affect, depression, self-efficacy for coping with pain, and pain catastrophising. Laboratory measures of disease activity were also included, specifically, interleukin-6 (IL-6), a proinflammatory cytokine related to disease activity. Following the interventions participants in the CBT group reported the greatest decrease in pain and reductions in IL-6. Both the CBT and the mindfulness meditation groups reported similar significant increases in self-efficacy for controlling pain when compared to the attention control group. In a further analysis, taking into account previous history of depression, the authors reported that participants with recurrent depression benefited most from mindfulness meditation more than those participants in the CBT group, specifically in affect and physician ratings of tender joints. The additional analyses of this study suggest that individuals with RA and a history of recurrent depression may benefit more from mindfulness meditation than CBT.

In summary, meditation has shown to be a promising psychosocial intervention in other chronic conditions such as fibromyalgia, specifically reducing depression. Studies conducted with RA patients provide some evidence for the usefulness of meditation, particularly mindfulness meditation for patients with relatively stable RA and a history of

recurrent depression. However as there are limited studies investigating the effects of meditation in RA patients, the evidence to support this psychosocial intervention is inconclusive. Furthermore, it requires a lengthy amount of time for participants to practice, for example, two and a half hour sessions were reported by Pradhan et al. (2007) and this may be a complication for patients who may perceive this to be very time consuming.

Biofeedback. Biofeedback techniques are designed to enable participants to gain control over physiological processes, for example muscle tension (Dixon et al., 2007). Specifically, it is assumed that by gaining control over muscle tension will result in decreased pain (Nicholson & Blanchard, 1993). This psychosocial intervention usually involves the use of electrical equipment which records and amplifies physiological signals which then provides visual or auditory feedback to the participant (Arena & Blanchard, 2002). With practice individuals learn to regulate physiological processes such as heart rate and breathing rate by controlling the feedback signal (Morone et al., 2007). Traditionally, biofeedback usually forms part of multimodal therapy involving other interventions such as cognitive behavioural therapy, imagery, and relaxation (Andrasik, 2004). There is some evidence for the use of this psychosocial intervention in chronic pain conditions such as tension headaches and chronic joint pain (Arena, Hannah, Bruno, & Meador, 1991; Kabela, Blanchard, Applebaum, & Nicholson, 1989).

Table 2. Summary of psychosocial interventions involving an element of biofeedback for RA

First Author (year)	Design	Any other modality	Sample Size	Control	Intervention Duration	Individual or Group	Outcomes measured	Results
Achterberg (1981)	Randomised trial with no follow-up	relaxation	39	physiotherapy group	8 1hr sessions over 10 weeks	Individual	Pain, tension, sleep patterns, psychological well-being, physical function.	Significant decrease in pain and tension, improved sleep pattern observed with no significant differences between groups.
Applebaum (1988)	RCT with 18 months follow-up	Cognitive pain management	18	Wait list control	10 1hr session over 6 weeks	Individual	Pain, sleep, depression, anxiety, disability, and grip strength.	Significant reduction in pain and disability at psot-intervention. No significant effects at follow-up.
Bradley (1987)	RCT with 6 months follow-up	CBT	53	Care as usual Social support with family group	5 2hrs sessions	Group	Anxiety, depression, pain, helplessness, RF, ESR, grip strength, and tender joints.	Intervention group reported significant reduction in pain and disease activity. No significant effects at follow-up. Young <i>et al.</i> , (1995) reported decreased reduction in RA related clinic visits, suggesting economic benefits of this intervention.

In a novel study with the use of biofeedback and mock biofeedback as a control in patients with chronic rheumatic back pain, Flor, Haag, Turk, and Koehler (1983) reported that participants with the real biofeedback reported significantly lower levels of pain intensity, and pain duration compared to those who received the mock biofeedback. The results of this study indicate positive benefits for this type of psychosocial intervention in patients with chronic pain.

The use of biofeedback in RA populations is limited. Only three studies were identified which utilised this form of intervention (see table 2). Furthermore, these studies were multimodal, involving relaxation and cognitive behavioural therapy for pain reduction. Therefore, it is impossible to state the efficacy of biofeedback in RA. However, in an early study, Applebaum, Blanchard, Hickling, and Alfonso (1988) reported significant reductions in pain and disability when biofeedback was employed in conjunction with cognitive pain management techniques. However, the authors further reported that at 18 months follow-up there were no significant differences between the intervention and control group. Similarly, Bradley et al. (1987) reported significant decreased pain and disease activity following five two hour sessions of biofeedback combined with cognitive behavioural therapy. However, at six months follow-up there were no significant differences between the intervention and control group. Interestingly, in a long term follow-up of the participants reported by Bradley et al. (1987) it was noted that those participants who received the multimodal biofeedback intervention had significantly fewer RA related clinical and hospital admissions (Young, Bradley, & Turner, 1995).

In summary, studies using biofeedback as an adjunct treatment in RA vary in the administration and duration of the intervention, for example one study reported participants received eight one-hour sessions (Achterberg et al., 1981), in another study participants received ten one-hour sessions. The lack of standardisation in the content and the number of

sessions causes difficulty in determining the efficacy of this particular psychosocial intervention. In order to assess the effectiveness of biofeedback in RA, future studies should standardise the number of sessions and use this modality in isolation. As the literature currently stands, there is limited evidence for the use of biofeedback in reducing the short-term symptoms associated with RA, and no long-term efficacy. Additionally, the equipment used for this modality can be expensive and thus its use is further limited.

Cognitive Behavioural Therapy (CBT). CBT is a psychosocial intervention where the focus of treatment is to modify an individual's thought processes in order to change their behaviour (Beck, 1970). The definition of CBT poses a problem for both researchers and clinicians due to the fact that this type of intervention often includes a variety of approaches (e.g., education, skills training, problem solving), and different theoretical frameworks (e.g., cognitive therapy, behaviour therapy, and rational emotive therapy; Dobson & Dozois, 2001). Irrespective of a definition, a central theme of CBT is the systematic application of psychological principles for beneficial therapeutic outcome (Luskin et al., 2000).

The application of CBT as a psychosocial intervention has prominence in the mental health field, particularly in personality disorders and behavioural problems (Cooper, 2008). However there is a growing use of CBT in targeting specific symptoms of chronic disease (Butler, Chapman, Forman, & Beck, 2006), such as pain (Morley, Eccleston, & Williams, 1999), and depression associated with adapting to chronic conditions (Gloaguen, Cottraux, Cucherat, & Blackburn, 1998).

Specifically related to RA, out of 18 studies identified in this review using CBT as a psychosocial intervention, 14 measured pain as an outcome and nine of these reported a significant decrease in pain at post-intervention (see table 3). However, 13 studies provided follow-up data which identified that pain was not significantly lower at follow-up.

Table 3. Summary of psychosocial interventions involving Cognitive Behavioural Treatment for RA

First Author (year)	Design	Any other modality	Sample Size	Control	Intervention Duration	Individual /Group	Outcomes measured	Results
Bradley (1987)	RCT with 6 months follow-up	Biofeedback	53	Care as usual Social support with family group	5 2hrs sessions	Group	Anxiety, depression, pain, helplessness, RF, ESR, grip strength, and tender joints.	Significant reduction in pain and disease activity. No significant effects at follow-up.
Evers (2002)	RCT with 6 month follow-up	-	59	Care as usual	1hr session twice a week for 5 weeks + 1 session 4 weeks later	Individual	ESR, swollen and tender joints, pain, functional disability, depression, anxiety, and mood.	Significant decrease in depression at post-intervention and follow-up.
Freeman (2002)	RCT with 3 and 6 month follow-ups	-	53	Education control group with information on joint care	2hrs/week for 4 weeks	Group	Tender and swollen joints, pain, functional disability, and psychological well-being.	The control group had significantly greater improvement in tender and swollen joint count at 3 month, but not at 6 month follow-up.

Table 3. CBT interventions cont,

Kaplan (1981)	RCT with no follow-up	Group counselling	34	Care as usual	1-2hrs/week for 12 weeks	Group	Self-concept, depression, swollen and tender joints, morning stiffness, and rheumatologist assessment of severity.	Depression significantly lower at post-intervention.
Keefe (1999)	Randomised trial with 6 and 12 month follow-ups.	Relaxation and imagery	82	No control group. Group 1: spouse assisted coping skills, group 2: CBT involving imagery, group 3: group 2 plus spouse assisted coping skills	2 hours/week for 10 weeks	Group	Pain, functioning, and psychological well-being.	Group 3 reported significantly less pain than group 1, but only at post- intervention. Group 2 reported significantly better function than group 1 at 12 month follow-up. Group 3 reported less psychological disability than group 1 but only at post-intervention.

Table 3. CBT interventions cont,

Kelley (1997)	RCT with 3 month follow-up	Talking about most stressful or traumatic event	72	Control group described neutral pictures	15mins/day for 4 consecutive days	Individual	Sress, mood, disability, pain, tender and swollen joint count, and grip strength.	Post-intervention no differences between the groups. At follow-up intervention group had significantly decreased disability.
Kraaimaat (1995)	RCT with 3 and 12 month follow-ups	Relaxation, coping with pain and stress.	77	Care as usual Wait list control	2hrs/week for 10 weeks	Not reported	ESR, C-reactive protein (CRP), walking time and joint score.	No significant differences between any of the groups.
Leibing (1999)	RCT with no follow-up.	Relaxation, imagery and pain management.	55	Care as usual	1.5hrs/week for 12 weeks.	Group	Swollen joints, pain, functioning, depression, and anxiety.	Significant decrease in pain, depression and anxiety for intervention group.
Lindroth (1997)	RCT with 12 month follow-up	Education	96	Care as usual	2.5hrs/week for 8 weeks	Group	Pain, disability, and psychological health.	Post-intervention significant decrease in pain, however not significant at follow-up.

Table 3. CBT interventions cont,

Multon (2001)	RCT with 3 and 15 month follow-ups.	Relaxation training	128	Care as usual Attention control group (education)	1.5hrs/week for 10 weeks, additional sessions every 3 months for 15 months.	Individual	Pain behaviours.	No significant differences between any groups.
O’Leary (1988)	RCT with 4 month follow-up	Imagery and relaxation techniques	33	Care as usual with Arthritis Helpbook	2hrs/week for 5 weeks	Not reported	Pain, depression, disability, coping, self-efficacy, sleep behaviour, ESR, tender joints, and perceived stress.	Significant improvements in pain and self- efficacy at post- intervention. Only self-efficacy remained significant at follow-up.
Parker (1995)	RCT with 3 and 15 month follow-ups	-	141	Attention control (education with family) Care as usual	1.5hrs/week for 10 weeks and at least once every 3 months till follow-up	Individual	Pain, swollen and tender joint count, stress, depression, anxiety, self- efficacy, and coping.	Significant improvements in pain, stress, self- efficacy and coping at 3 months. Only self-efficacy and coping remained significant at 15 month follow-up.

Table 3. CBT interventions cont,

Parker (2003)	RCT with 6 and 15 month follow-ups	Anti-depressant (AD) medication	54	Attentional control AD group AD control group	1.5hrs/week for 10 weeks and at least once every 3 months till follow-up	Individual	Depression, stress, anxiety, helplessness, Self-efficacy, fatigue, pain, ESR, grip strength, disease activity, and daily morning stiffness.	Significant improvement in depression, helplessness, self-efficacy, anxiety, coping, and fatigue, but no significant differences between groups.
Radojevic (1992)	RCT with 2 month follow-up		59	Care as usual Attention control (education, video presentations)	90mins/week for 6 weeks	Group	Pain, physical functioning, depression, swollen joint, and coping.	Intervention group reported significantly lower pain and depression at post-intervention, however not significant at follow-up.
Rhee (2000)	RCT with 15 month follow-up	Relaxation, stress management, and social support networks	141	Care as usual Attention control group (patient education programme)	2hrs/week for 10 weeks with 1 visit each three months until 15 month follow-up.	Individual	Depression, pain, helplessness, Self-efficacy, and coping.	Significant improvements in self-efficacy, and significant reductions in pain and depression post-intervention. Self-efficacy remained significant at follow-up.

Table 3. CBT interventions cont,

Scholten (1999)	RCT with 6 week and 12 month follow-up.	Relaxation training	64	Care as usual	9 sessions over two weeks with monthly meetings.	Group	Functioning, Protective behaviours, and depression.	No statistical differences between the groups, but trend for improvement in intervention group over time.
Sharpe (2001)	RCT with 6 months follow-up	Relaxation training	45	Care as usual	1 hour/week for 8 weeks	Individual	Clinical assessment using Ritchie articular index, pain, functional disability, depression, and anxiety.	Intervention group significantly improved clinical assessment and significantly less depression at post- intervention and follow-up.
Zautra (2008)	RCT with 6 months follow-up	Relaxation, coping strategies, and autogenic training	144	Education group as attention placebo control Meditation group comparison	2hrs/week for 8 weeks	Group	Pain, positive and negative affect, depression, coping efficacy for pain, pain catastrophising, physicians assessment of disease severity, and IL-6 (pro- inflammatory cytokine)	Post-intervention the CBT group reported significant reduction in pain and IL-6. Both CBT and meditation groups reported significant improvement in coping efficacy for pain.

Six studies reported CBT interventions significantly reducing depression in RA patients, and in two studies this reduction in depression remained significant at six months follow-up (Evers, Kraaimaat, van Riel, & de Jong, 2002; Sharpe et al., 2001). However, no significant decreases in depression was reported in six other studies (O'Leary, Shoor, Korig, & Holman, 1988; Parker et al., 1995; Parker et al., 2003; Scholten et al., 1999; Zautra et al., 2008). Five studies measured anxiety as an outcome and only one reported a significant decrease when compared to the control group following the CBT intervention (Leibing et al., 1999). Five studies measured self-efficacy for controlling pain. Of these, four studies reported significant improvement following the intervention which was maintained at follow-up (O'Leary et al., 1988; Parker et al., 1995; Rhee et al., 2000; Zautra et al., 2008).

Disability was measured in nine of the studies, however only one study reported a significant decrease in disability following a CBT intervention, which remained significantly lower 12 months follow-up (Keefe et al., 1999). In terms of disease activity, 13 studies included laboratory measures of disease activity and/or swollen and tender joints. Ten studies reported that the CBT intervention had no impact on disease activity. However, Bradley et al. (1987) reported a significant decrease in the number of swollen joints at post-intervention in their CBT group when compared to the control group. Additionally, Freeman, Hammond, and Lincoln (2002) reported a significant reduction in the number of swollen and tender joints in their CBT group when compared to the control group. Finally, Zautra et al. (2008) reported a significant decrease in the proinflammatory cytokine IL-6 post-intervention. However, in all three of these studies the authors report that there were no significant differences in measures of disease activity at six months follow-up.

In determining the efficacy of this approach it is clear that the multimodal nature of this intervention poses some difficulties. For example, eight of the eighteen studies identified used relaxation with their CBT intervention, four added imagery, biofeedback was included

as part of the intervention package in another study. Thus, it is impossible to know which component of these CBT interventions was responsible for the outcome, or indeed whether a combination of modalities is necessary for the most beneficial outcome. Furthermore, half of the studies identified in this review administered CBT as a group intervention, thus the effects of social support may confound the results. Indeed, three of the studies which administered the intervention in an individual setting reported no significant outcomes, whereas when applied in a group setting only one study which reported no significant change in any of the outcomes.

In summary, this review indicates that utilising CBT as a psychosocial intervention in RA has a significant beneficial impact in relation to pain and self-efficacy for controlling pain in RA patients. Additionally, this type of psychosocial intervention is more beneficial when administered in a group rather than an individual setting. This raises the question of increased social support influencing outcome. Furthermore, given the nature of CBT it could be argued that the investigation of this intervention as a singular mode of psychosocial intervention is not possible.

Education. Education or patient information interventions are designed to enable patients with chronic diseases to adapt to, and cope with the consequences of their disease (Nicholas, 2008). In relation to RA, Lorig and Holman (1993) state that the purpose of this type of psychosocial intervention is to maintain or improve the health status of the individual. Within the UK a standardised approach has been developed towards patient education for arthritis. The Arthritis Self-Management Programme (ASMP; Lorig et al., 1993) was designed as a community based patient information programme, embedded within the principles of Bandura's (1991) self-efficacy theory. Although primarily education based, the ASMP is a multimodal intervention which may include exercise, cognitive symptom

management (e.g. imagery and relaxation techniques), and communicating effectively with family and medical professionals.

A recent study using this programme in osteoarthritis patients reported increased self-efficacy for controlling pain, increased performance of adaptive health behaviours, improved functioning, and less depression, when compared to a control group, 4 months follow-up (Barlow, Turner, & Wright, 2000). Barlow et al. (2000) also reported significant decreases in pain and depression, and increased self-efficacy for controlling pain, which was maintained at 12 months follow-up.

Fourteen studies were identified in this review examining the efficacy of education interventions for RA patients (see table 4). Similar to the ASMP intervention, education interventions identified in this review were multimodal. Indeed, nine of the studies identified included a combination of CBT (e.g. coping with pain, goal setting, and problem solving skills), relaxation techniques, physical therapy, and exercise. Four studies identified had no follow-up period, four had a follow-up of less than six months, and the remaining six had a follow-up period of more than six months but no more than 12 months. The intervention varied across studies, for example a leaflet about RA and its symptoms, and group discussion with health professional.

Five of these studies reported no significant differences in any outcomes measured at post-intervention, between the education group and a control group. Given the type of intervention employed in these studies it was surprising that only three studies measured knowledge as an outcome. Two of these studies reported a significant increase in knowledge at post-intervention (Barlow, Pennington, & Bishop, 1997) and 6 months follow-up (Barlow & Wright, 1998) when compared to a control group. The other study reported no significant differences in knowledge of RA between their intervention and control group (Maggs, Jubb,

& Kemm, 1996). Pain was measured as an outcome in nine studies, however only four of these reported significant decreases post-intervention (Barlow et al., 1997; Fries et al., 1997; Hammond & Freeman, 2001; Lindroth et al., 1997), and two reported maintained significance, one at six months follow-up (Fries et al., 1997), and the other at 12 months follow-up (Hammond et al., 2001). Of the seven studies that measured disability none reported that an education intervention had any significant impact. However, of five studies measured physical functioning, two studies reported significant increase at post-intervention (Savelkoul, de Witte, Candel, van der Tempel, & van den Borne, 2001), with one reporting significant improvement at six months follow-up (Fries et al., 1997).

Only one study reported a significant improvement in depression following intervention (Barlow et al., 1997). No study reported a significant decrease in anxiety following the education intervention. Although education interventions have a theoretical underpinning in self-efficacy theory, only two studies measured self-efficacy, and none of these reported any significant change (Barlow et al., 1997; Barlow et al., 1998).

In relation to clinical assessment of RA following an education intervention, five studies reported the number of tender joints as an outcome. However, only one of these reported a significant decrease when compared to the control group, which remained significant at six months follow-up (Fries et al., 1997). Four studies reported no significant change in the number of swollen joints following an education intervention (Brus, van de Laar, Taal, Rasker, & Wiegman, 1998; Fries et al., 1997; Hammond, Lincoln & Sutcliffe, 1999; Hammond et al., 2001). Two studies measured laboratory indicators of inflammation (e.g. ESR and CRP) and reported no significant change or difference between the control groups (Brus et al., 1998; Kraaimaat et al., 1995).

Table 4. Summary of psychosocial interventions involving education for RA

First Author (year)	Design	Any other modality	Sample Size	Control	Intervention Duration	Individual or Group	Outcomes measured	Results
Barlow (1997)	RCT with no follow-up	-	108	Care as usual	1 leaflet	Individual	Functional disability, pain, fatigue, anxiety, depression, self-efficacy, and knowledge of RA	Significant increased knowledge, decreased pain, and depression reported by intervention group.
Barlow (1998)	6 month follow-up of Barlow (1997)	-	84	Care as usual	1 leaflet	Individual	Functional disability, pain, fatigue, anxiety, depression, self-efficacy, and knowledge of RA	Intervention group maintained significant increase in knowledge. No significant changes in any other outcome.
Bell (1998)	RCT with 12 weeks follow-up	Physical therapy	127	Care as usual	3-4hrs/week for 6 weeks	Individual	Tender joint count and pain	No significant differences between the groups at post-intervention or follow-up

Table 4. Educational interventions cont,

Brus (1998)	RCT with 8 months follow-up	Exercise intervention and medicine adherence programme	55	Care as usual	2hrs/week for 4 weeks, with booster sessions at 4 and 8 months	Group	Ritiche articular score, swollen and tender joint count, ESR, pain, physical functioning, activity levels, adherence to medication, and psychological well- being	Significant increase in amount of physical activity at post-intervention, but not at follow-up.
Fries (1997)	CBT with 6 months follow-up	education and exercise	809	Care as usual	Video	Individual	Swollen and tender joint, pain, physical functioning, quality of life, and hospital doctor visits.	Significantly lower tender joints and pain, improved function, increased quality of life, and significantly lower number of doctor visits at follow-up.
Hammond (1999)	RCT with no follow- up	-	33	Care as usual	2hrs/week for 4 weeks	Group	Swollen and tender joint count, pain, functional disability, joint protection behaviour assessment, and joint protection practice	Joint protection assessment significantly better. Both groups also had significantly better joint protection practice.

Table 4. Educational interventions cont,

Hammond (2001)	RCT with 6 and 12 months follow-up	Behavioural training and goal setting	123	Standard education control group	4 x 2hr sessions	Group	Tender and swollen joint count, pain, activities of daily living, joint protection.	Significantly decreased pain at 12 months follow-up, significantly improved activities of daily living and joint protection at 12 months
Hill (2001)	RCT with no follow-up	-	63	Care as usual with drug information leaflet.	30mins/month for 6 months	Individual	Articular index, pain, and adherence to medication.	Adherence to medication significantly higher in intervention group.
Kraaimaat (1995)	RCT with 3 and 12 month follow-up	CBT, relaxation, coping with pain and stress.	77	Care as usual Wait list control	2hrs/week for 10 weeks	not reported	ESR, C-reactive protein (CRP), walking time and joint score.	No significant differences between any of the groups.
Maggs (1996)	RCT with no follow-up	-	132	Care as usual Education with 30-60min discussion	1 leaflet	Individual	Knowledge of RA, Nottingham Health Profile (energy, pain, emotion, sleep, social, and mobility) and functional disability	Both leaflet groups reported significant increase in knowledge of RA, with no difference between them. No other significant changes reported.

Table 4. Educational interventions cont,

Lindroth (1997)	RCT with 12 month follow-up	CBT: problem solving skills	96	Care as usual	2.5hrs/week for 8 weeks	Group	Pain, disability, and psychological health.	Post-intervention significant decrease in pain, however not significant at follow-up.
Lord (1999)	RCT with 1, 3, 6, and 12 months post-intervention.	Practical tasks including exercise and relaxation.	126	Care as usual	1 hour/week for 4 weeks	Group	Pain, function, and psychological well-being.	No significant differences reported between the group in any of the outcomes
Savelkoul (2001)	RCT with 6 month follow-up	Coping skills training	168	Wait list control Mutual support group	2hrs/week for 10 weeks	Group	Active coping, coping through seeking social support, positive and negative social interactions, loneliness, functional health status, and life satisfaction.	Post-intervention, significant improvement in active coping, functional health status, and loneliness. At follow-up loneliness and life satisfaction significant.
Scholten (1999)	RCT with 6 week and 12 month follow-up.	CBT: counselling, education programme.	64	Care as usual	9 sessions over two weeks with monthly meetings.	Group	Functioning, Protective behaviours, and depression.	No statistical differences between the groups, but trend for improvement in intervention group over time.

In summary, given the lack of standardisation in the mode of administration and the content of the intervention between these studies the evidence to support the efficacy of education interventions is inconclusive. Moreover, Jones (2002) argues that educational interventions are not a treatment modality, but an ethical requirement. This may explain the lack of education intervention studies post-2002.

Imagery. Imagery has been defined as the generation of images from at least one sensory modality for the purpose of evoking a psycho-physiological state (Astin et al., 2003). Although normally associated with relaxation, Post-White (2002) argues that imagery and relaxation are separate modalities and need not be combined to have therapeutic effects. However throughout the literature, imagery forms part of a therapeutic package including other modalities such as relaxation, CBT, and music (Astin et al., 2003). Imagery combined with other modalities has shown to be effective for reducing stress, anxiety, and depression in patients with breast cancer undergoing radiotherapy (Nunes et al., 2007), reducing pain and improving health related quality of life in patients with chronic tension headache (Mannix, Chandurkar, Rybicki, Tiesk, & Solomon, 1998), and reducing pain and mobility difficulties in patients with osteoarthritis (Baird & Sands, 2004).

Specifically for RA, seven studies were identified which included imagery (see table 5). No study utilised imagery as a treatment modality on its own. Only one study included an attention control group within the design, two studies did not include any control group, and four studies included a care as usual control group. Follow-up was not included in the design of two studies, three studies had a follow-up period of less than six months, and two studies had a follow-up of more than six months. The number and duration of intervention session varied between the studies, specifically the number of sessions varied between five and 12, and the duration varied between 30 minutes and two hours.

Table 5. Summary of psychosocial interventions involving an element of imagery for RA

First Author (year)	Design	Any other modality	Sample Size	Control	Intervention Duration	Individual or Group	Outcomes measured	Results
Jacobi (2001-2002)	Experimental trial, follow-up at 6, 12, and 18 weeks	Music	27	No control group	1.5hrs/week for 10 weeks	Individual	Pain, depression, anxiety, joint swelling, morning stiffness, CRP, ESR, and Rheumatoid Factor (RF).	Participants reported a significant decrease in pain post-intervention, which was sustained through to 18 week follow-up. There was a significant decrease in anxiety and depression at 18 week follow-up. No significant changes in biological measures of disease activity.
Leibing (1999)	RCT with no follow-up	CBT (information), relaxation, pain management, and coping skills	55	Care as usual	1.5hrs/week for 12 weeks.	Group	Swollen joints, pain, functioning, depression, and anxiety.	Significant decrease in pain, depression and anxiety for intervention group.

Table 5. Imagery interventions cont,

Lundgren (1999)	RCT with 6 and 12 month follow-up	Relaxation techniques	60	Care as usual	30mins twice weekly for 10 weeks.	Not reported	Pain and functional disability.	Significant decrease in disability for intervention group, but only at 6 months follow-up.
O’Leary (1988)	RCT with 4 month follow-up	CBT and relaxation techniques	33	Care as usual with Arthritis Helpbook	2hrs/week for 5 weeks	Not reported	Pain, depression, disability, coping, self-efficacy, sleep behaviour, ESR, tender joints, and perceived stress.	Significant improvements in pain and self-efficacy at post-intervention. Only self-efficacy remained significant at follow-up.
Radojevic (1992)	RCT with 2 month follow-up	Behavioural therapy including relaxation and coping skills	59	Care as usual Attention control (education, video presentations)	1.5hrs/week for 6 weeks	Group	Pain, physical functioning, depression, self- efficacy, swollen joint, and coping. .	Intervention group reported significant decreased pain, depression, disability, and self- efficacy post- intervention. At follow up coping and self-efficacy significant.

Table 5. Imagery interventions cont,

Rider (1990)	Experimental trial comparing arthritis and lupus patients	Music and group psychotherapy	13 (5 lupus, 4 RA, and 4 OA)	no control group	1hr individual session, followed by 1hr/week group sessions for 5 weeks	Group	Daily activity, anxiety.	All patients reported improvement in daily activity, no significant change in anxiety scores.
Taal (1993)	RCT with 4 and 14 month follow-up	Education, coping with depression, and relaxation skills	75	Care as usual	2hrs/week for 5 weeks	Group	Pain, physical functioning, depression, swollen joint, and coping.	Intervention group reported significantly lower pain and depression at post- intervention, however not significant at follow- up.

Six studies measured pain as an outcome following the imagery intervention. Of these, four studies reported a significant reduction in pain when compared to a control group post-intervention (Leibing et al., 1999; O'Leary et al., 1988; Radojevic et al., 1992; Taal et al., 1993). However, none of these studies reported any significant reduction in pain at follow-up. One study did report a significant reduction in pain at post-intervention, which was maintained at 18 weeks follow-up (Jacobi & Eisenberg, 2001-2002), whereas another study reported no significant change in pain post-intervention (Lundgren & Senstrom, 1999). However, neither these two last studies had a control group in their design.

Self-efficacy for controlling pain was measured in two studies (O'Leary et al., 1988; Radojevic et al., 1992). Both studies reported significant increases in self-efficacy when compared to a control group. Furthermore, in both studies self-efficacy for controlling pain remained significantly higher than the control group at two months follow-up (Radojevic et al., 1992) and four months follow-up (O'Leary et al., 1988).

Five studies measured functional disability as an outcome. Two studies reported a significant decrease post-intervention (Lundgren et al., 1999; Radojevic et al., 1992). Furthermore, Lundgren et al. (1999) reported significant reduction in disability at six months follow-up. Of the five studies that examined depression, three studies reported a significant reduction (Leibing et al., 1999; Radojevic et al., 1992; Taal et al., 1993), however these reductions in depression were not significant at follow-up. Jacobi et al. (2001-2002) reported a significant reduction in depression post-intervention and 18 weeks follow-up, however with no control group the results from this study are inconclusive.

Anxiety was measured as an outcome in three of the studies identified with an imagery intervention. Leibing et al. (1999) reported a significant decrease post-intervention

which was not maintained at follow-up. However, Jacobi et al. (2001-2002) reported a significant decrease at post-intervention which was maintained at 18 week follow-up.

In relation to clinical outcomes in RA following an imagery intervention, four studies included the number of swollen joints as an outcome (Jacobi et al., 2001-2002; Leibing et al., 1999; Radojevic et al., 1992; Taal et al., 1993), however none of these studies reported any significant decreases. Only one study included the number of tender joints and they reported no significant change at post-intervention (O'Leary et al., 1988). Two studies examined changes in ESR and reported no significant change (Jacobi et al., 2001-2002; O'Leary et al., 1988). One study included CPR and rheumatoid factor and reported no significant change post-intervention (Jacobi et al., 2001-2002).

In summary, studies employing imagery as a psychosocial intervention in patients with RA provide some evidence of the therapeutic benefits in relation to decreased pain and increased self-efficacy for controlling pain. However, imagery was combined with other therapeutic modalities. Therefore it is unknown whether imagery as an intervention in isolation has any impact of the symptoms of RA. Indeed, repeatedly in the literature it is suggested that imagery should be examined as an intervention without any other combined therapies in order to investigate the mechanisms and the extent to which imagery influences chronic conditions such as RA (Astin, Beckner, Soeken, Hochberg, & Berman, 2002; Luskin et al., 2000; Morone et al., 2007). Consequently, a general objective of the present research programme was to investigate the effects imagery as a psychosocial intervention without combining it with any other therapeutic modality.

Hypnotherapy. Hypnotherapy is defined as 'a state of inwardly focussed attention in which the mind is focussed on ideas of therapeutic value that can potentiate psychophysiologic change' (Anbar, 2006, p.438). During a hypnotic state it is assumed that

the conscious mind is guided to become dormant while the unconscious mind becomes more ready and open to suggestion (Spiegel, Greenleaf, & Spiegel, 2000). The therapeutic value of this psychosocial intervention has been recognised in acute and chronic pain. For example in an early review of hypnotherapy in pain conditions, Holroyd (1996) concluded that hypnotherapy was equally, if not more effective, than other psychosocial interventions for reducing pain. In another review of randomised controlled trials involving hypnotherapy, Patterson and Jensen (2003) reported significant decreases in self-reported pain in both acute and chronic pain patients. More recently, Jensen and Patterson (2006) reviewed the evidence for hypnotherapy for pain in patients with a variety of chronic conditions, including cancer-related pain, fibromyalgia, and osteoarthritis. The authors reported significant decreases in pain for each of these conditions. Importantly, significant reductions in pain were observed at 12 months follow-up.

Hypnotherapy has proven an effective psychosocial intervention in areas other than pain. For example, post-operative wound healing (Ginandes, Brooks, Sando, Jones, & Aker, 2003), dermatological conditions such as warts (Shenefelt, 2000), irritable bowel syndrome (Gonsalkorale, Houghton, & Whorwell, 2002), and reduced feelings of nausea and vomiting following chemotherapy (Zeltzer, Dolgin, LeBaron, & LeBaron, 1991; Jacknow, Tschann, Link, & Boyce, 1994).

Despite the evidence for hypnotherapy as an effective adjunct treatment for many chronic conditions, there is little research examining its effectiveness in RA. Indeed, this review of the literature identified only two published research papers. In an early clinical trial of hypnotherapy with no control group Domangue, Margolis, Lieberman and Kaji (1985) demonstrated significant decreases in pain, anxiety, and depression post-intervention. The authors also reported significant increased plasma levels of β -endorphin. They concluded that hypnotherapy not only reduces self-report levels of pain, but also a biochemical correlate of

pain intensity. Although this study indicates some evidence for hypnotherapy reducing the symptoms of RA, including biochemical indices, there are several limitations. As there was no control group in the study there is a possibility that the changes observed were not the result of the intervention. Furthermore, the authors did not report disease activity, as the natural progression of the disease is characterised with unpredictable flares, participants may have been recovering from such flares. This may have had a greater impact on the outcomes measured, rather than the hypnotherapy intervention.

More recently, Horton-hausknecht, Mitzdorf, and Melchart (2000) conducted a randomised controlled trial investigating the effects of hypnotherapy. Within the design of the study the authors included a wait list control group and a relaxation group. Participants in the hypnotherapy and relaxation groups each received ten group intervention sessions, where each session lasted no more than one and a half hours. The outcomes measured included joint pain, morning stiffness, joint swelling, and a German translation of the Arthritis Impact Measurement Scale (Meenan, Gertman, & Mason, 1980). Measures of disease activity (ESR and CRP) were also included. Following the intervention sessions the authors reported significant decreases in joint pain, joint swelling, significantly improved activities of daily living and body activity, and a significant reduction in ESR. The authors concluded that hypnotherapy produced clinically significant decreases in disease activity and self-reported pain.

However methodological flaws in this study require the results to be interpreted with caution. For example, some participants chose which arm of the study they wanted to participate in, and the intervention was conducted in small groups. The results of this study may therefore be contaminated by confounding variables such as expectancy and social support. Furthermore, although the authors conducted analyses for within-group changes, they do not report any between-group differences. For example, both intervention groups

demonstrated significantly reduced ESR, however it may be that there were no significant differences between the groups, therefore the results do not inform us whether hypnotherapy was more effective than relaxation in RA.

In summary, only two studies exist examining the use of hypnotherapy as a psychosocial intervention in RA. Both these studies indicate that hypnotherapy may provide some therapeutic benefits for the symptoms related to RA (e.g. reducing pain and biological markers associated with disease activity). However, due to methodological issues the results of these studies do not provide conclusive evidence of the effectiveness of this type of intervention for patients with RA. Given the efficacy of this psychosocial intervention in other chronic conditions and the lack of studies within the RA literature, a general objective of the present research programme is to investigate the effects of hypnotherapy in patients with RA.

Conclusions from the Literature Review

This review of psychosocial interventions for the management of symptoms related to RA provides some evidence of their effectiveness in the short-term, however as the majority of studies fail to report any significant differences at follow-up, their use in the long-term is inconclusive. A general limitation of the majority of these psychosocial interventions is the multimodal nature of the intervention. As a consequence of this, it is extremely difficult to conclude whether one approach is more or less effective than another. Furthermore, very few studies report the effect sizes of these interventions. Where effect sizes are reported they are generally low to moderate post-intervention, and become non-significant at follow-up. A further limitation is the lack of studies measuring disease activity following a psychosocial intervention. The biopsychosocial model of disease in RA provides a systems perspective of

RA, in that, changes in one part of the system can produce changes in the other parts of that system (Keefe et al, 2002). However, many studies fail to test this assumption of the model.

Psychosocial Interventions in the Present Research Programme

Imagery and hypnotherapy were chosen as the psychosocial interventions for a number of reasons. First, in relation to relaxation, Nicholas (2008) argues that relaxation is a useful adjunct, but there is no evidence that it would be beneficial as a stand-alone therapy. Second, although the use of meditation provides some promising results from the few studies published using this intervention, it requires a lengthy amount of time for participants to practice, for example, two and a half hour sessions were reported by Pradhan et al. (2007). Third, the results from studies involving biofeedback show no long term efficacy and the apparatus involved in this technique can be expensive and therefore its use is limited. Fourth, numerous studies already exist on the efficacy of CBT and reduction of RA symptoms and due to the nature of this multimodal intervention it is difficult to conclude which parts are effective. Fifth, as with CBT interventions there are numerous studies investigating the effect of education interventions, the majority report no long term efficacy. Additionally, given the criticisms of Jones (2002), restricting an education intervention to one particular group of a study would be unethical. Imagery and hypnotherapy are simple inexpensive techniques which if proven beneficial for symptom reduction in RA could easily be utilised as self-management techniques.

Specifically, within this research programme the effects of imagery and hypnotherapy as psychosocial interventions without the addition of any other modality will be addressed throughout the proceeding chapters. Additionally it will be explored whether these psychosocial interventions have any beneficial impact on disease activity in patients with active RA.

CHAPTER THREE

HEALTH-RELATED QUALITY OF LIFE IN RHEUMATOID ARTHRITIS: COMPARING A PATIENT REPORTED OUTCOME MEASURE AND A PATIENT GENERATED OUTCOME MEASURE FOLLOWING A PSYCHOSOCIAL INTERVENTION¹

¹ This research was presented as an oral presentation at the Annual European Congress of Rheumatology, EULAR, in June 2008, the abstract was accepted for publication: Bennett, B.M., Callow, N. & Jones, J. (2008). Individualised quality of life in rheumatoid arthritis following a psychosocial intervention. *Annals of Rheumatic Diseases*, 67 (suppl 2), 82 & 655.

Abstract

Objective. The present study had three objectives. Firstly, to examine whether a health-related quality of life (HRQOL) patient reported outcome measure (PROM) would capture items identified as being important by participants with rheumatoid arthritis (RA) in a HRQOL patient generated outcome measure (PGOM). Secondly, to examine the relationship in HRQOL between a PROM and a PGOM, following a patient-centred psychosocial intervention. The third objective of the study was to examine possible differences in HRQOL in RA following an imagery or hypnotherapy intervention.

Method. Forty two participants with stable RA were randomised to an imagery intervention, hypnotherapy intervention, or 'care-as-usual' control group. Participants completed the Patient Generated Index (PGI) a HRQOL PGOM and the SF-36 a HRQOL PROM, at pre-intervention, six weeks post-intervention, and six months follow up.

Results. The SF-36 failed to capture 27% of the items identified on the PGI. Participants reported a significant increase in HRQOL when measured with the PGI, however no change was reported when using the SF-36. Participants in the imagery and hypnotherapy group reported significantly higher HRQOL when compared to the control group post-intervention. At follow-up, only the hypnotherapy group remained significantly higher than the control group.

Conclusions. The use of PROMs such as the SF-36 may not be measuring what is perceived to be HRQOL in individuals with RA. PGOMs, such as the PGI are appropriate for enhancing a patient-centres approach and for measuring HRQOL following tailored interventions.

Patient reported outcome measurements (PROMs) are instruments that measure any aspect of a person's health reported directly by the patient (Marshall, Haywood, & Fitzpatrick, 2005). Examples of PROMs used routinely in research and clinical practice include visual analogue scales for pain and fatigue, and fixed-item measures such as the hospital anxiety and depression scale (Zigmond & Snaith, 1983), and the Short Form 36 Health Survey Questionnaire (SF-36; Ware & Sherbourne, 1992).

In clinical practice, several roles for these measures have been proposed. For example, Gilbody, Whitty, Grimshaw, and Thomas (2003) state that PROMs can be used to improve patient-provider communication by allowing patients to report the severity of their own symptoms. They can also be used to identify patient preferences to enable clinicians to make informed decisions (McHorney, 2002). Lindblad, Ring, Glimelius, and Hansson (2002) further state that the use of PROMs facilitates shared decision making and goal setting between the patient and provider within the health care process. These roles help build upon a patient-centred model of treatment and may promote greater patient satisfaction with healthcare (Hirsh et al., 2005) and increased compliance to treatment (Fuertes et al., 2007).

The area of health related quality of life (HRQOL) has witnessed a growth in the number of PROMs used in research and clinical practice (Emery, Perrier, & Acquadro, 2005). This reflects the increased importance of HRQOL as an outcome in health research (Patrick & Chiang, 2000) and in patient perceptions in the health care process (Carr & Higginson, 2001). HRQOL is that part of overall quality of life affected by health (Moriarty, Zack, & Kobau, 2003) and includes an individual's perception of life satisfaction in relation to treatment of illness or disease (Kushida et al., 2007). Indeed, in populations with a chronic condition, such as rheumatoid arthritis (RA), where there is no cure (Leibing, Pfingsten, Bartmann, Rueger, & Schuessler, 1999) and psychosocial factors have an influence on the

outcome of disease, the measurement of HRQOL has become a priority to help direct management of the condition (Fayers & Machin, 2000).

At a specific level, HRQOL is the sum of a number of life domains, for example physical function, psychological, emotional, and social well-being, which guide its measurement (Cummins, 1997). Central to the measurement of HRQOL, is the debate as to which type of measure should be employed (Arnold et al., 2004; Garratt, Schmidt, Mackintosh, & Fitzpatrick, 2002; Joyce, O'Boyle, & McGee, 1999). HRQOL measurement tools can be divided into two categories, fixed-item PROMs, and individualised, or patient generated outcome measurements (PGOMs). Further, within these categories, measures can be sub-divided into generic or disease-specific measures (Chorus, Miedema, Boonen, & van der Linden, 2003; Greenwood, Hakim, & Doyle, 2006).

The most widely used generic fixed-item HRQOL PROMs include the SF-36 (Ware & Sherbourne, 1992), the EuroQOL EQ-5D (Brooks, 1996); and the Nottingham Health Profile (NHP; Hunt, McEwan, & McKenna, 1986). Advantages of these fixed-item PROMs are their ease of administration (Fayers et al., 2000) and established psychometric properties (e.g., Stofmeel, Post, Kelder, Grobbee, & van Hemel, 2001; Luo et al., 2003; Sharples, Todd, Caine, & Tait, 2000). Furthermore, given the generic nature of these HRQOL PROMs, the results can be compared across disease specific groups and across different populations (Carr, Higginson, 2001).

Despite these advantages, fixed-item PROMs fail to acknowledge the unique nature of individuals (Patel, Veenstra, & Patrick, 2003) and this can create a number of limitations. First, many fixed-item HRQOL PROMs exclude the patient's perception of what is important (Day & Jankey, 1996). For example, in an early study Coates et al. (1983) identified that within a sample of cancer patients locating a parking space for their clinic appointment was one of the most important factors influencing HRQOL, rather than the items specified on the

fixed-item HRQOL PROM used in their study. Given the shift towards a patient-centred approach to treatment, it is surprising that many of these PROMs have been developed without public or patient involvement (Bowling, 1995).

Second, there is a degree of disparity in the HRQOL domains measured in these fixed-item measures. Specifically, the SF-36, reported as the ‘gold standard’ by some researchers (Jordon-March, 2002), does not include the domains of sleep, dependence/independence, sexual functioning, self-perception or body image, or perceptions of the future as HRQOL domains (Carr & Higginson, 2003). This raises concerns over the content validity of such measures. The omission of certain HRQOL domains in generic fixed-item PROMs can lead to problems because for people with chronic conditions some domains are more relevant than others. For example, in RA pain and fear of deformity are more important than body weakness, which is an important feature reported by patients with multiple sclerosis. Indeed, Arnold et al. (2004) provide evidence that psychological functioning contributes more to overall HRQOL in many chronic conditions than physical or social functioning. Therefore fixed-item HRQOL PROMs which have a greater emphasis on physical and social functioning may not adequately reflect the HRQOL of individuals with chronic conditions.

Third, generic fixed-item HRQOL PROMs may capture irrelevant information, for example, in a study of elderly hospitalised patients employing an individualised HRQOL measure, Dempster and Donnelly (2000) stated that many of the items in HRQOL PROMs would have been redundant. More specifically, items in the SF-36 asks about an individual’s ability to climb one flight or several flights of stairs, if the individual lives in a bungalow there will be no stairs to climb and these items may not be as relevant. Indeed, a person who is home-bound because of a chronic condition such as RA may well not be able to answer these questions.

Given these limitations it could be argued that generic HRQOL PROMs fall short in their proposed roles in relation to improving patient-provider communication, identifying patient preferences, or facilitating shared decision making in a healthcare process. It can also be argued that as these roles are not fulfilled then many HRQOL PROMs do not build upon a patient-centred model of health-care.

In an attempt to overcome these limitations researchers have used HRQOL PGOMs, for example Patient Generated Index (PGI; Ruta, Garratt, Leng, Russell, & MacDonald, 1994) and the Schedule for the Evaluation of Individual Quality of Life (SEIQoL; O'Boyle, Browne, Hickey, McGee, & Joyce, 1995). Typically, these PGOMs allow the individual, rather than the clinician, to identify areas of their life which they perceive as important. Advocates of this approach argue that content validity is enhanced (Greenhaugh, Long, & Flynn, 2005) and relevance is increased as PGOMs capture the individual's perception of what is important (Higginson & Carr, 2001). Furthermore, as they can be used to negotiate the goals of treatment and intervention they may promote patient-centred practice (Higginson et al., 2001).

Despite claims that fixed item HRQOL PROMs (e.g. SF-36) do not capture HRQOL as perceived by the individual (Dempster & Donnelly, 2000; Morris et al., 2006) research has yet to explore the relationship between HRQOL PROMs and PGOMs in RA patients. Consequently, one of the objectives of the present study was to allow individuals with a longstanding RA to identify HRQOL items using a HRQOL PGOM, and to examine whether these items would be captured by a generic fixed-item HRQOL PROM, the SF-36.

The HRQOL PGOM used in this study was the PGI (Ruta, et al., 1994). The PGI is based on Calman's (1984) theoretical conceptualisation of HRQOL as "the extent to which our hopes and ambitions are matched by experience" (p.125). Individuals identify up to five areas of their life that they perceive to be the most important (e.g., playing with

grandchildren, or having a leisurely walk with friends). Often, participants are given a 'prompt' list to help them identify areas. There is also a sixth item which represents all other aspects of the individual's life not captured in the identified five areas. Participants are then asked to score each area to reflect how seriously it is affected by their disease. Finally, they are asked to give their own weighting to each of these areas. The resultant index score is an overall reflection of the individuals perceived HRQOL.

The PGI has been used as an outcome measure to assess HRQOL across a wide range of chronic conditions, for example, severely disabled multiple sclerosis patients (Lintern, Beaumont, Kenealy, & Murrell, 2001), rectal cancer (Camilleri-Brennan, Ruta, & Steele, 2002), and head and neck cancer, (Llewellyn, McGurk, & Weinman, 2005). The use of HRQOL PGOMs is particularly relevant for patients with RA because it is a chronic musculoskeletal condition where the physical and psychosocial impacts of the disease vary from individual to individual (Hammond & Freeman, 2004). The symptoms of this disease (i.e. joint pain, swelling, stiffness and fatigue) have a variable impact on function and HRQOL (Gordon, Smith, & Dhillon, 2007). Employing the PGI as a HRQOL PGOM will enable patients with RA to generate their unique HRQOL. Consequently, the second objective of this study was examining the relationship in HRQOL when measured by SF-36, the most commonly used HRQOL PROM in RA trials (Kalyoncu, Dougados, Daures, & Gossec, 2008) and the PGI. Furthermore the items identified by the PGI can be used to negotiate the goals of treatment and in tailoring individual interventions, thus facilitating a patient-centred approach to intervention.

The interventions employed in this study were imagery and hypnotherapy. Both these interventions are cognitive therapeutic tools which involve the generation of images from at least one sensory modality (Suinn, 1984). However, within the literature there is a degree of confusion between these two interventions. The terms hypnosis, hypnotherapy, guided

imagery, and imagery are often used interchangeably and applied to both imagery and hypnotherapy (Zelter et al., 2002). For the purpose of this study imagery is defined as the generation of images from at least one sensory modality for the purpose of evoking a psychophysiological state (Astin, Shapiro, Eisenberg, & Forsys, 2003) and hypnotherapy is defined as 'a state of inwardly focussed attention in which the mind is focussed on ideas of therapeutic value that can potentiate psychophysiologic change' (Anbar, 2006, p.438).

Although imagery and hypnotherapy are similar cognitive therapeutic tools (Luskin et al., 2000) there is a procedural difference between them. In hypnotherapy there is an induction procedure involving relaxation and focussed attention (British Psychological Society, 2001), which is not involved in imagery. Within the health and medical literature, research has not explored any therapeutic difference between these two psychosocial interventions. Consequently, a third objective of this study was to examine differences in HRQOL in RA patients, following an imagery or hypnotherapy intervention.

In summary, the present study had three research objectives. The first of these was to compare how the items identified as important by RA patients in the PGI was related to the fixed items of the SF-36. It was hypothesised that because of the generic nature of the SF-36 and the individualised nature of the PGI, the SF-36 would not capture all items identified as important by the patient in the PGI. The second objective of the study was to examine the relationship in HRQOL, following a psychosocial intervention, when measured by a generic HRQOL PROM, the SF-36, and a PGOM, the PGI. In relation to this objective it was hypothesised that there would be no significant relationships in HRQOL between the SF-36 and the PGI because the intervention was tailored based on items identified in the PGOM. The final objective was to investigate possible differences in HRQOL between the SF-36 and the PGI, following an imagery or hypnotherapy intervention. It was hypothesised that there would be a significant increase in HRQOL, measured by the PGI, in both intervention groups

when compared to a control group. Furthermore, due to the additional induction procedure involved in hypnotherapy, we further hypothesised there would be significantly higher HRQOL reported by those participants in the hypnotherapy group when compared to those in the imagery group.

Method

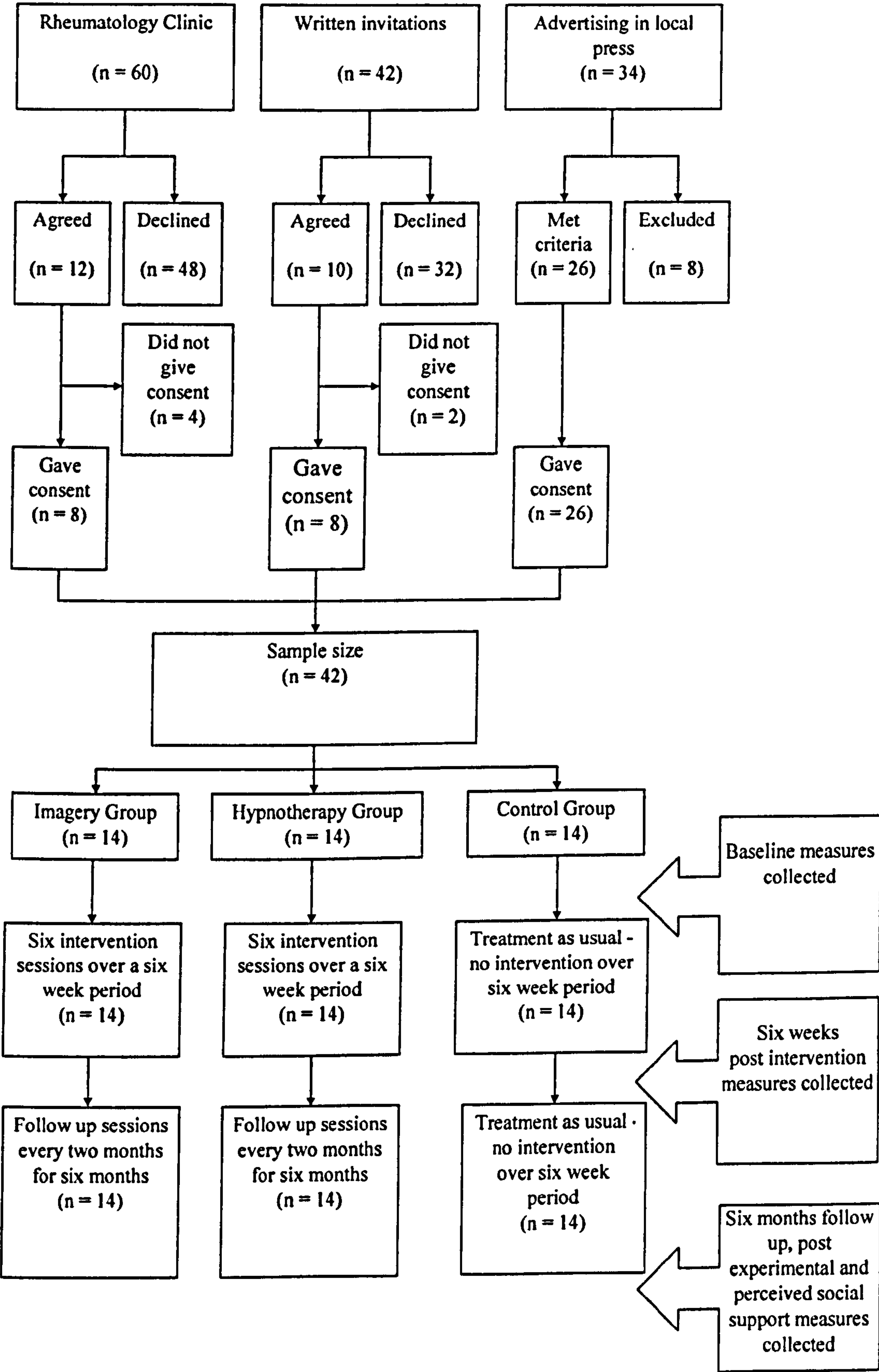
Participants

Forty two patients were recruited from the North West Wales NHS Trust rheumatology clinics, by written invitations sent to RA patients from a database made available from the rheumatology department, and through advertisements placed in the local press (see figure 1 for recruitment and randomisation flow chart). Inclusion criteria included a diagnosis of RA according to the American Rheumatism Association criteria (Arnett et al., 1987) for more than three years. To minimise the effect of flares of RA activity the participants must have had no change in prescribed medication within the last six months and no expected change in prescribed medication for the duration of the study. Participants were not paid to take part in the study however they could claim their travelling expenses.

Study Design

A randomised controlled intervention trial, three by three (group x time) factorial design with repeated measures on time was employed. The groups were imagery intervention, hypnotherapy intervention, and 'care-as-usual' control group. Data collection time points were pre-intervention, six week post intervention, and six months follow-up. The study was approved by the Local Ethics Committee of North West Wales NHS Trust. Written informed consent was obtained from all participants.

Figure 1. Recruitment and Randomisation Flow Chart



Sample Size Calculation

A sample size of 57 was calculated through the following assumptions and methods. There were no studies in the literature that have used the PGI as a primary outcome measure following a psychosocial intervention. However Astin et al. (2002) conducted a meta-analysis of psychosocial interventions in RA are reported moderate to large effect sizes for psychosocial functioning following this type of intervention. Furthermore, Jenkinson, Stradling, & Peterson (1997) reported an effect size of 1.33 in a study using the PGI following a medical intervention for obstructive sleep apnoea. Therefore it was assumed that psychosocial interventions can produce large effect sizes in RA and that the PGI is sensitive to large effect sizes with an intervention.

As the design of the study is repeated measures Stevens (1996) method for calculating sample size was followed. Stevens (1996) uses Cohen's (1992) effect size value of 0.1, 0.25, and 0.4 for small, moderate, and large effect sizes respectively, with one way ANOVAs. Assuming an average correlation of 0.5 between the repeated measures variables, the Cohen effect size is divided by the square root of 1 minus 0.5 (i.e. the average correlation), with the product of a (large) effect size of 0.57. With repeated measures of 3 (pre, post, and follow-up), an alpha level of 0.01, a large effect size of 0.57, and a power of 0.8, according to Stevens (1996) a sample size of 19 in each group is required.

Randomisation

Participants were randomised to either an imagery group, a hypnotherapy group, or a 'care-as-usual' control group using an internet based package (www.randomizer.org), with an equal number of males and females in each group. Participants randomised to the control group were offered sessions in either imagery or hypnotherapy after the duration of the study.

Measurements

HRQOL using a PGOM. The primary outcome measure was the Patient Generated Index (PGI: Ruta et al., 1994). The PGI is a HRQOL PGOM. When completing the PGI, participants are asked to identify up to five areas of their life that they perceive as being important (e.g. playing with grandchildren, leisure walking etc.). A score between 0 (*the worst you could imagine*) and 10 (*exactly as you would like it to be*) is allocated by participants to reflect how seriously each of these areas is affected by their disease. Participants are then asked to give their own weighting to each of these areas. This is conducted by dividing 12 points on each of the areas identified. The more points spent on a particular area indicates greater importance. The resultant index score is an overall reflection of that individuals perceived HRQOL. Higher index scores indicate higher perceived HRQOL. The PGI has good reliability, validity, and responsiveness (Martin, Camfield, Rodham, Kleimpt, & Ruta, 2007).

HRQOL using a PROM. The SF-36 questionnaire is a generic HRQOL PROM which contains 36 items. These items are grouped into eight subscales measuring physical functioning, role limitations due to physical health, bodily pain, general health, vitality, social functioning, role limitations due to emotional problems, and mental health. Scores on each subscale are expressed as values between 0 and 100 where a high score indicates good health. The SF-36 has been shown to have good psychometric properties (McHorney, Ware, & Raczek, 1993) and is the most frequently used measure of HRQOL in RA (Kalyoncu et al., 2008).

The questionnaire pack given to participants also contained measures relating to pain, fatigue, pain anxiety, arthritis self-efficacy, and functional disability (see Appendix A). The outcome of these measures is reported in chapter four of this research thesis.

A post experimental questionnaire (see Appendix B) was administered after the six month follow-up to gain information about what participants expected and hoped would happen to the symptoms of their disease by taking part in the study, and their reaction to which group they were randomised into. Hope and expectation were measured with a 100mm visual analogue scale, which was anchored with the statements '*no change*' and '*a lot of change*' at opposite ends. Initial reaction to randomisation was measured using a 100mm visual analogue scale with the anchors '*very dissatisfied*' and '*very satisfied*'. Participants were asked about the frequency of using an audio recording of the intervention, and how easy it was to schedule the intervention into their daily life routine. These variables were analysed to identify possible confounding effects in the results.

As social support has been shown to have a beneficial effect on HRQOL for patients with RA (Minnock, Fitzgerald, & Bresnihan, 2003), a modified version of the perceived social support scale (PSS; Procidano & Heller, 1983) to include social support from the experimenter was used to examine possible experimenter effects (see Appendix C). Scores on the perceived social support scale range from +20 to -20 where higher scores indicate greater perceived social support.

Procedure

Patients meeting the inclusion criteria were given an information sheet detailing the objectives of the study, a brief description of imagery and hypnotherapy, and what would be involved if they decided to participate. If patients decided to participate they were given a consent form and a questionnaire pack which contained a copy of the PGI and the SF-36. Returned consent forms and questionnaire packs were allocated a study number. This was entered into the on-line randomisation software package to allocate patients to each group. After randomisation, participants in the intervention groups choose whether to attend the six weekly intervention sessions at a private room in the School of Sport, Health, and Exercise

Sciences, Bangor University or in their own home. All intervention sessions were conducted by the same researcher throughout the duration of the study.

After participants had completed the six weekly intervention sessions they completed the same questionnaire pack and three follow-up sessions were timetabled over a six month period. Participants in the control group continued with 'care-as-usual' and completed the same questionnaire pack six weeks after consent was taken.

For post-intervention and follow-up, the original items that participants had identified as being important in the PGI were written in the PGI questionnaire however, participants were informed that they could change these items if they felt they were no longer important, or if something more important was relevant to them. At six months follow-up all participants completed the questionnaire pack, the post experimental questionnaire, and the modified perceived social support questionnaire.

Intervention

The first session in both intervention groups was standardised and the content of the five remaining sessions were based on the items identified in the PGI (see Appendix D and E for examples of imagery and hypnotherapy sessions). If a participant identified less than five items, the remaining sessions consisted of repetition of the previous sessions. The intervention sessions lasted approximately one hour, and all sessions were recorded. Participants were given an audio CD recording of the first standardised session, and the subsequent intervention sessions, and asked to practice the intervention on a daily basis. The three follow-up sessions were based on the previous six sessions and participants were also encouraged to continue using the audio CD's on a daily basis.

Data Analyses

Patient characteristics. Univariate statistics (means and standard deviations) were used to examine participant characteristics. One-way ANOVA were conducted to examine any differences in patient characteristics between the groups. The assumptions of normality and homogeneity of variance were not violated.

Reliability and responsiveness of the PGI and the SF-36. Reliability of the PGI in this sample was assessed using the index of change (IOC) method (Ruta et al., 1994), and responsiveness was assessed using effect size. Responsiveness of the SF-36 was assessed using effect sizes, using the guidance provided by Cohen (1988).

HRQOL: Relationship between a PROM and a PGOM. To test the hypothesis that the SF-36 would not capture all of the important items identified by participants in the PGI, four researchers independently categorised the items into the domains of the SF-36. Fleiss' kappa value was used to calculate the level of inter-rater reliability as there were more than 2 independent raters (Fleiss, 1971). The items not captured by the SF-36 were also recorded.

In order to test the hypothesis that there would be no significant relationship in HRQOL between the SF-36 and the PGI a series of correlations were performed between the scores of these two measures at baseline, post-intervention, and follow-up. Scores for the intervention groups were combined, and control group data were excluded from this analysis. The assumptions of normality, linearity, and homoscedaticity were not violated. Interpretation of Pearsons correlation was defined by Cohen (1988) where values less than 0.29 are small, values between 0.30 and 0.49 were accepted as medium, and any value greater than 0.50 was accepted as large. Additionally, if these two measures were measuring the same construct, namely HRQOL, then similar trends would be expected across time between the two measures. Therefore repeated measures ANOVAs were conducted, using data from combining the intervention groups only, to examine the trend over time in HRQOL as

measured by the SF36 summary scales and the PGI. The assumptions of normality, homogeneity of variance, and homogeneity of inter-correlations were not violated. Significance was accepted as $p < 0.05$.

HRQOL: Following an Imagery or Hypnotherapy Intervention. In order to test the hypothesis that the intervention groups would report a significant increase in HRQOL when compared to the control group, and that the hypnotherapy group would report greater HRQOL than the imagery group a two-way repeated measures ANOVA was conducted to assess intervention effects from baseline, six weeks post-intervention and six months follow-up for PGI scores. Additionally, a series of two-way repeated measures ANOVA were conducted to assess intervention effects from baseline, six weeks post-intervention and six months follow-up for all the subscales of the SF-36. The assumptions of normality, homogeneity of variance, and homogeneity of inter-correlations were not violated. Significance was accepted as $p < 0.05$ (one-tailed tests). Tukeys test was employed as a post hoc procedure.

Post experimental data and manipulation check. A series of one-way ANOVAs were conducted on expectation, hope, initial reaction to randomisation, and independent samples t-test on frequency of use of CD to assess whether there were any differences between the groups. Where any difference was identified, follow-up correlation analyses were conducted to assess the relationship between these variables and changes in HRQOL at post-intervention and follow-up.

Perceived social support from the experimenter was used as a manipulation check. This was thought essential as the literature indicates that additional social support may confound the results of outcome measurement in intervention studies (Stone, Kerr, Jacobson, Conboy, & Kaptchuk, 2005; Spiro, 1998). Mann-Whitney tests were conducted to investigate the differences in perceived social support received from the experimenter between the

groups. Spearman's rho correlations were conducted to investigate the relationship between the perceived social support received from the experimenter and the SF-36 subscales and PGI scores.

Results

Patient Characteristics

A total of 136 patients with RA were invited to participate in this study. Due to the time constraints and the difficulty in recruiting patients to participate in this study the required sample size was not achieved. Forty two patients who met the criteria agreed to participate and completed all stages of the study. Thirty of the participants were female. The mean age of participants was 59 years ($sd=9.1$) and there were no significant differences in age within the three groups. The majority of participants (83%) were either married or living as married. Three participants were widowed, three were divorced and one participant was single. The mean disease duration was 160 months ($sd=104$) and there were no significant differences in disease duration between the three groups.

Reliability and Responsiveness of PGI and SF-36

The IOC value of the PGI in this study was 0.976. This high value indicates that at post-intervention and follow-up, participants changed very few of the original items they identified as being important at baseline. The responsiveness of the PGI was assessed by the effect size. The effect size following the intervention was large ($\eta^2=0.368$) indicating the PGI to be responsive to changes in HRQOL. The consistency and responsiveness shown in these results indicate that the PGI is a reliable measure of HRQOL in our sample of RA patients. Effect sizes for the SF-36 subscales were very low ($\eta^2=0.02$ to 0.04). These low effect sizes observed in the SF-36 subscales and summary scales indicate that this was not a responsive measure in our study.

HRQOL: Relationship between a PROM and a PGOM

A total of 165 items were identified by participants in this study. Table 6 provides a summary of the number of items identified under each of the SF-36 subscales.

Table 6. Number of items identified in the PGI, and SF-36 subscales with Fleiss' kappa.

		SF-36 subscales*								
		PF	RP	BP	GH	VT	SF	RE	MH	Not in SF-36
PGI items	N ^a	48	42	28	5	13	37	4	10	45
	%	29	25	17	3	8	22	2	6	27
Fleiss' kappa = 0.78										

* PF=physical functioning, RP=role limitations due to physical health, BP=bodily pain, GH=general health, VT=vitality, SF=social functioning, RE=role limitations due to emotional problems, MH=mental health

^a Some items identified in the PGI could be classified in more than one subscale of the SF-36

Of these 165 items, 27% (45 items) were not categorised into any of the SF-36 subscales. Fleiss' kappa amongst the four researchers was calculated to be 0.78, indicating substantial agreement (Landis & Kock, 1997). Figure 4 presents the items from the PGI which were not captured by the SF-36. The most commonly identified areas not captured by the SF-36 included, problems with sleep, problems with concentration, fear of having a flare, fear of becoming deformed, not being able to plan for the future, and remaining independent.

Figure 2. Items identified in the PGI and not captured in SF-36.

Problems with sleep (7).	Fear of a flare up (5).
Problems with concentration (4).	Planning for the future (3).
Fear of deformity (3).	Being able to travel more comfortably.
Being independent or losing independence (3).	Keeping up my hobbies and using my hands more.
Love life – being able to love my wife more.	Having a better sex life with my wife, problems with medication.
Having to keep a medicine regime to keep me in reasonable health.	Manual dexterity, especially sewing and mending things.
Being able to think more creatively when designing jewellery.	Hobbies – photography, walking to places of interest, sports.
Being able to help others and feel needed.	Not feeling caged in all the time.
Rambling and walking for pleasure.	Doing my needlework.
Putting on weight because I can’t exercise as much.	Keeping up my hobbies, getting involved in all the [archaeological] digs.
Helping my wife with her illness.	Stiffness, stops me from living.
Being able to dance more gracefully.	Can’t travel as much as I would like to.
Being able to use the small parts of the camera.	Craft making – difficulties with my hands.

At baseline, correlation analyses between scores on the SF-36 subscales and the PGI indicate significant correlations between five of the SF-36 subscales and the physical summary scales, with scores on the PGI. However, at post-intervention, the number of significant correlations decreased, with only four of the subscales and the physical summary scale having significant correlations with scores on the PGI. At follow-up only two of the subscales and the physical summary scale remained significantly correlated with scores on the PGI (see Table 7 for a summary of the results).

Results from repeated measures ANOVA reveal no significant effect for time, for the physical or mental summary scales of the SF-36, indicating that HRQOL as measured by the SF-36, for the combined intervention groups, did not change significantly over the time of the intervention period. However, repeated measures ANOVA for the PGI reveal a significant main effect for time and a very large effect size (Wilks' Lambda = 0.452, $F(2,26)=15.786$, $p<.0005$, $\eta^2=0.584$). This result indicates that HRQOL as measured by the PGI did change significantly, for the combined intervention group, over the time of the intervention period.

In summary, at baseline there were several significant correlations between the SF-36 subscales and summary scales, and the PGI, but the number of significant correlations decreased at post-intervention, and again at follow-up. This suggests poor convergent validity between these two HRQOL measures. Furthermore, as the repeated measures ANOVAs revealed no change in HRQOL when measured by the SF-36, yet significant changes when measured with the PGI, we can conclude that these two measures are not measuring the same construct.

HRQOL: Following an Imagery or Hypnotherapy Intervention

HRQOL measured using a PROM the SF-36. A one-way ANOVA revealed significant differences in the SF-36 physical function scale ($p=0.01$) and SF-36 physical summary scale ($p=0.04$) between the groups at baseline. Two two-way analysis of covariance were conducted using group (imagery, hypnotherapy or control) and time (post-intervention, and follow-up) as the independent variables and pre-intervention SF-36 physical function scale and physical summary scale scores as covariates. The assumptions of linearity and homogeneity of regression slopes were not violated. The assumption of homogeneity of variance was violated, however Stevens (1996) identified that when group sizes are equal the test is still robust.

Table 7. Pearsons correlations between the PGI and the SF-36 (including means and standard deviations)

PGI		SF-36 subscale scores ^a									
scores		PF	RP	BP	GH	VT	SF	RE	MH	PS	MS
Pre	Mean	44.0	35.3	36.5	39.3	36.8	43.3	42.5	44.0	48.3	49.3
	(Std dev)	(18.1)	(10.6)	(10.3)	(8.4)	(9.8)	(11.8)	(13.0)	(11.5)	(12.4)	(14.4)
	Corr	-	.378*	.420*	.584**	.466*	.468*	<i>ns</i>	<i>ns</i>	.514**	<i>ns</i>
Post	Mean	57.0	33.7	35.6	38.5	39.3	44.0	43.7	41.0	47.6	49.5
	(Std dev)	(15.9)	(11.5)	(9.1)	(7.8)	(10.9)	(10.3)	(11.8)	(13.3)	(11.9)	(11.4)
	Corr	-	.449*	<i>ns</i>	.378*	.434*	.518**	<i>ns</i>	<i>ns</i>	.467*	<i>ns</i>
F.U	Mean	50.8	33.2	36.7	39.7	40.5	43.6	45.2	43.7	49.9	52.0
	(Std dev)	(16.3)	(10.3)	(9.8)	(7.5)	(8.9)	(11.0)	(9.9)	(12.3)	(10.4)	(9.9)
	Corr	-	<i>ns</i>	.474*	<i>ns</i>	<i>ns</i>	.511**	<i>ns</i>	<i>ns</i>	.489**	<i>ns</i>

^a PF=physical functioning, RP=role limitations due to physical health, BP=bodily pain, GH=general health, VT=vitality, SF=social functioning, RE=role limitations due to emotional problems, MH=mental health

* correlation significant at .05 level (two-tailed)

** correlation significant at .01 level (two-tailed)

ns no significant relationship

The results of the ANCOVA revealed that the covariate was not significant (physical function, $p>0.05$; physical summary scale, $p>0.05$). Consequently, two-way repeated measures ANOVA were conducted using group (imagery, hypnotherapy or control) and time (pre-, post-intervention, and follow-up) as the independent variables. No main effects or significant interactions for either the physical function or the physical summary scales of the SF-36 were found.

A one-way ANOVA revealed no significant differences between the groups and the other SF-36 scale scores at baseline. Two-way repeated measure ANOVA's revealed no significant main effects or interactions for any of the other SF-36 subscales. In summary, none of the three groups reported any change in HRQOL from baseline to follow-up, when measured with the SF-36 (summary of results presented in tables 8 to 10).

Table 8. HRQOL using the SF-36: Imagery group (means and standard deviation)

		SF-36 subscale scores									
		PF	RP	BP	GH	VT	SF	RE	MH	PS	MS
Pre	Mean	30.6	35.5	39.2	39.0	45.0	42.8	44.0	51.8	31.2	52.6
		(6.7)	(9.5)	(7.4)	(9.8)	(9.2)	(10.6)	(10.2)	(8.2)	(7.0)	(8.8)
Post	Mean	32.2	36.6	40.4	41.4	47.5	47.6	43.3	53.1	33.9	54.2
		(9.2)	(9.9)	(8.2)	(11.6)	(10.3)	(11.1)	(13.4)	(8.5)	(10.2)	(11.2)
F.U	Mean	34.0	38.7	40.4	41.2	45.2	47.0	48.4	54.2	34.5	55.7
		(9.3)	(9.7)	(8.6)	(9.4)	(13.2)	(9.8)	(7.7)	(9.1)	(10.8)	(8.7)

Table 9. HRQOL using the SF-36: Hypnotherapy group (means and standard deviations)

		SF-36 subscale scores									
		PF	RP	BP	GH	VT	SF	RE	MH	PS	MS
Pre	Mean	40.0	37.5	39.5	34.6	41.7	42.3	44.1	44.8	36.6	45.9
		(11.9)	(11.3)	(9.7)	(9.7)	(14.0)	(15.4)	(13.1)	(15.1)	(10.1)	(18.1)
Post	Mean	35.1	34.6	36.6	37.1	40.5	39.7	38.8	42.2	36.3	44.7
		(13.6)	(8.6)	(7.2)	(10.1)	(9.4)	(11.5)	(13.4)	(12.5)	(11.2)	(9.7)
F.U	Mean	32.4	34.7	38.9	39.8	42.1	43.4	39.0	45.6	34.8	48.3
		(11.6)	(9.8)	(6.4)	(8.7)	(8.4)	(10.0)	(14.4)	(10.1)	(9.6)	(10.0)

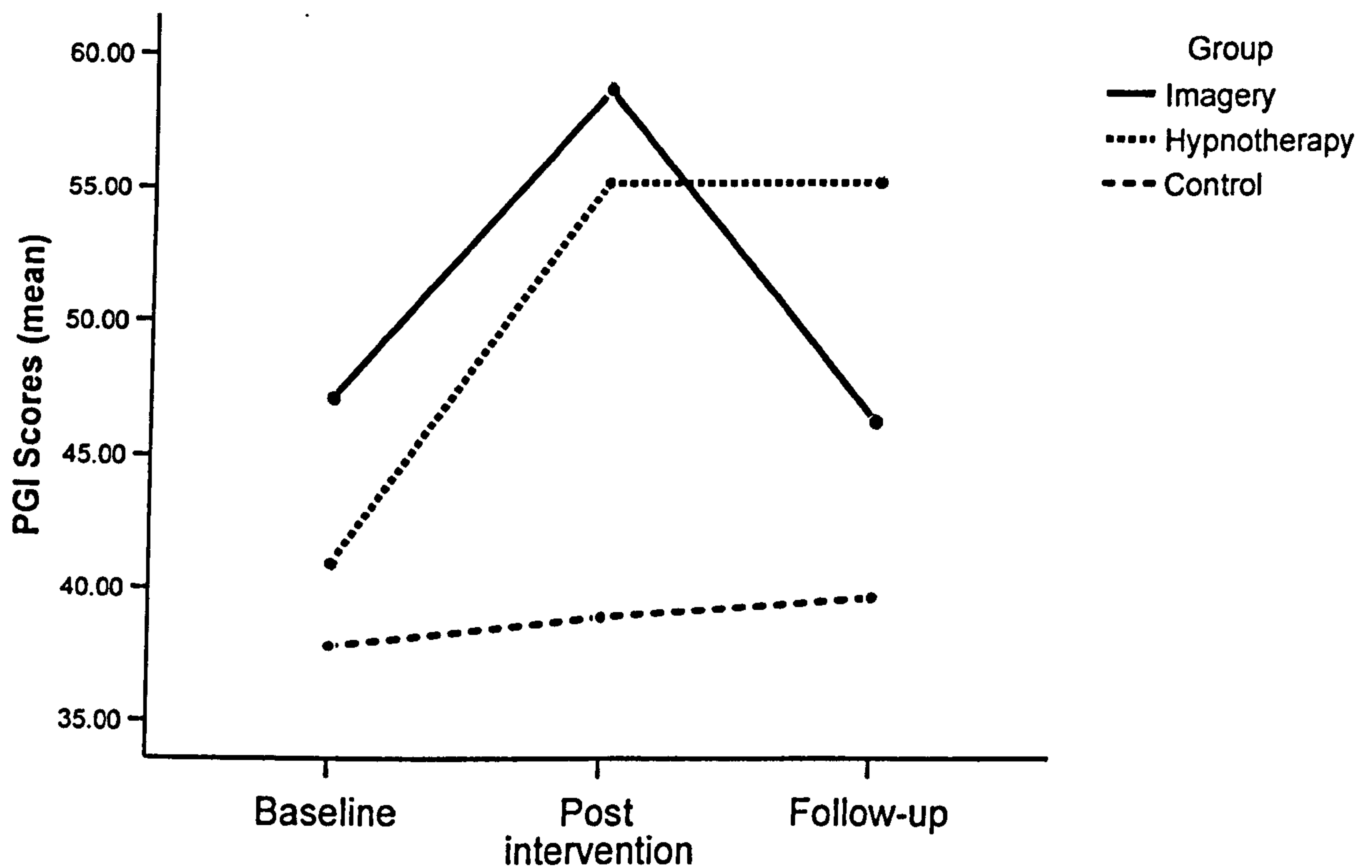
Table 10. HRQOL using the SF-36: Control group (means and standard deviations)

		SF-36 subscale scores									
		PF	RP	BP	GH	VT	SF	RE	MH	PS	MS
Pre	Mean	39.5	39.9	44.4	41.2	49.8	44.8	46.2	50.2	39.2	52.0
		(6.5)	(7.1)	(4.5)	(6.0)	(7.5)	(5.4)	(5.9)	(7.2)	(7.4)	(9.1)
Post	Mean	40.4	42.3	45.4	42.8	51.4	48.6	47.4	51.8	40.2	54.4
		(9.8)	(9.2)	(6.8)	(6.8)	(8.6)	(7.1)	(7.6)	(6.6)	(8.7)	(5.7)
F.U	Mean	41.4	44.2	46.9	44.3	50.7	49.6	48.3	51.8	41.6	54.6
		(10.2)	(8.4)	(6.6)	(6.4)	(7.9)	(5.8)	(6.5)	(5.6)	(8.6)	(5.7)

HRQOL measured using a PGOM the PGI. A one-way ANOVA revealed no significant differences in PGI scores at baseline. A two-way analysis of variance was conducted using group (imagery, hypnotherapy or control) and time (baseline, post-intervention, and follow-up) as the independent variables and PGI scores as the dependent variable. A significant main effect for time, $F(2,78)=9.998, p<0.001 (\eta^2=0.368)$ and group $F(2,39)=3.375, p<0.05 (\eta^2=0.148)$ were revealed. Of more central interest was a significant

group by time interaction, $F(4,78)=4.575$, $p=0.002$ ($\eta^2=0.195$). Follow-up Tukeys test revealed both the imagery (58.8, $sd=16.8$) and hypnotherapy (55.3, $sd=15.4$) groups had significantly higher mean scores on the PGI ($p=0.005$ and $p=0.0018$ respectively) than the control group (38.9, $sd=13.0$), with no significant differences between the imagery and hypnotherapy groups, at post-intervention. At follow-up the hypnotherapy group (55.3, $sd=15.7$) had significantly higher mean scores on the PGI ($p=0.029$) than the control group (39.7, $sd=14.5$), there was no significant difference between the imagery (46.3, $sd=16.2$) and hypnotherapy group, and no significant difference on PGI mean scores between the imagery and control group. In summary, the imagery group report increased HRQOL at post-intervention, however at follow-up this decreased to baseline levels. The hypnotherapy group also report increased HRQOL at post-intervention, and this was maintained at follow-up. The control group report no change in HRQOL from pre-intervention to follow-up. Figure 3 illustrates the changes over time in the mean PGI scores for the three groups.

Figure 3. HRQOL measured by the PGI.



Post Experimental Questionnaire and Manipulation Check

There were no significant differences between the three groups in what participants expected would happen to their condition by participating in this study. However, the control group scored significantly lower than the hypnotherapy group ($p=0.04$) on what they hoped would happen to their condition as a result of taking part in this study. Additionally, the control group scored significantly lower than both intervention groups on their reaction to the randomisation process ($p<0.001$; see table 11 for a summary of the results).

Table 11. Mean and standard deviation for post experimental data by group.

	Imagery	Hypnotherapy	Control
What did you expect to happen? ^a	4.6 (1.44)	5.6 (1.6)	5.3 (1.44)
What did you hope would happen? ^a	6.4 (1.68)	7.5 (1.65)	6.2 (1.25)*
Initial reaction to randomisation ^a	6.9 (1.68)	8.0 (1.68)	3.9 (1.35)*
How often practice baseline to post-intervention? ^b	6.4 (1.94)	5.6 (2.06)	-
How often practice post-intervention to follow-up? ^b	4.1 (2.10)	3.7 (2.01)	-
How easy to fit into your daily schedule? ^c	6.0 (1.71)	5.6 (1.69)	-

^ascores between 0 and 10, where higher scores indicate greater expectation for change, hope for change, or satisfaction with randomisation.

^bscores between 0 and 10, where higher scores indicate a greater frequency of practicing the intervention.

^cscores between 0 and 10, where higher scores indicate greater ease fitting the intervention into daily schedule.

* control group significantly lower (p<0.05)

Despite these differences, follow-up Pearson correlation analyses revealed that there was no significant relationship with changes in HRQOL scores and what participants hoped would happen by taking part in this study, and their reaction to the groups they were randomised to. No significant differences were found between the two intervention groups and the frequency in which they practiced the intervention during the six weeks post-intervention and six month follow-up. In summary, the results of the post-experimental questionnaire indicate that expectation, hope, reaction to randomisation, frequency of using

the CD, or the ease of scheduling the intervention into daily life routines were not significantly related to changes in HRQOL.

Perceived social support received from the experimenter (2.7, $sd=0.5$) was significantly lower than social support received from either family (15.6, $sd=0.5$) or friends (15.3, $sd=0.4$; $\chi^2=58.908$, $p<0.005$). There were no significant differences between perceived social support received from the experimenter in the imagery and hypnotherapy group. Perceived social support received from the experimenter was significantly higher ($Z=-3.204$, $p<0.001$ and $Z=-3.54$, $p<0.001$) in the imagery (3.5, $sd=1.04$) and hypnotherapy (4.2, $sd=0.9$) group when compared to the control group (0.2, $sd=0.3$). However, there were no significant correlations between changes in PGI scores, or changes in SF-36 subscale scores and perceived social support received from the experimenter in the imagery or hypnotherapy groups. Therefore we can conclude that although perceived social support from the experimenter was higher in both intervention groups, as would be expected, correlational analyses suggest that changes in HRQOL scores and level of perceived social support from the experimenter were not significantly related.

Discussion

The measurement of HRQOL has become an important outcome within research and clinical practice, especially in patients with chronic conditions such as rheumatoid arthritis. With the growth of HRQOL PROMs and PGOMs it is crucial that the appropriate measure is chosen (Arnold et al., 2004; Garratt et al., 2002; Joyce et al., 1999). In determining which measures are appropriate the definition of HRQOL must be considered. Because the definition of HRQOL includes an individual's perception of what is important to them (Kushida et al., 2007), it seems logical that to include patient perceptions in HRQOL measures. The objective of this study was to compare a HRQOL PROM and PGOM, to identify whether the most common used HRQOL PROM in RA trials, the SF-36, was capable

of capturing patient perceptions of what is important as recorded on a PGOM, the PGI. Additionally, this study sought to identify whether the outcome of these two HRQOL measures would change similarly following a patient-centred imagery or hypnotherapy intervention. Finally, to explore the efficacy of these two psychosocial interventions in relation to improved HRQOL.

The results of this study confirm our first hypothesis, in that the SF-36 was unable to capture all the items identified as important by patients with RA. On average, one out of every five items (20%) identified in the PGI by each participant was not captured in the SF-36. The important identified items in this study are similar to those identified from qualitative studies of patient group discussions (Kirwan, Heiberg, & Hewlett, 2003; Kirwan et al., 2005) including sleep, fatigue, a return to normality, and independence.

McHorney (2002) has stated that PROMs enable the identification of patient preferences, and Haywood (2006a) suggests that the clinical decision making process is not fully informed when measures do not take into account the patient's perspective. The SF-36 did not fully elicit patient preferences in our sample of RA patients. Given that the SF-36 is the most common used HRQOL PROM in RA trials (Kalyoncu et al., 2008), the results of this study indicate significant implications for future RA trials investigating HRQOL. Specifically, using fixed-item generic measures such as the SF-36 will result in the omission of important outcomes, and may not reflect beneficial change in outcome. Furthermore, the clinical implications of this are important. For example, problems with sleep and anxiety in relation to fear of deformity and flare-up were identified by several of the participants in the PGI, but not captured by the SF-36 in this study. Both sleep problems and increased anxiety have shown to be predictive of increased disease activity in RA patients (Abad, Sarinias, & Guillemineault, 2007; Isik, Koca, Ozturk, & Mermi, 2007). Given that HRQOL measures are increasingly utilised to help clinicians make informed choices and evaluate patient

satisfaction with treatment, using the SF-36 in this role may provide misleading information. When trying to identify patient preferences, clinicians should be wary about using PROMs of HRQOL such as the SF-36, as these do not capture important aspects of an individuals' HRQOL. Indeed, the results from the present study indicate there is a difference between PROMs of HRQOL, such as the SF-36, and PGOMs of HRQOL, such as the PGI.

When considering the measurement of HRQOL, there is much debate as to which type of measure should be employed (Arnold et al., 2004). Some authors regard the SF-36 as the 'gold standard' in HRQOL (Jordon-March, 2002). However the results of our study support Bradley et al. (1999) who state that the SF-36 is not an adequate measure of HRQOL of patients with chronic conditions. Furthermore, Joyce et al. (1999) have suggested when measuring HRQOL it is crucial to gain an understanding of what the individual perceives as important. The PGI specifically sets out to perform this task, whereas the fixed-item construct of the SF-36 does not.

If these two measures were measuring the same construct, then high intercorrelations between their scores and similar trends in the outcomes of these measures would be observed. However, the number of significant intercorrelations decreased over time and there is a difference in the outcome of HRQOL between the PROM and the PGOM. This result confirms the second hypothesis that there would be a difference in HRQOL between these two measures. This difference between the PROM and the PGOM used in this study reflects the general concern amongst researchers about what HRQOL measures are actually measuring (Kind, 2003). A conclusion which can be identified from the results of this study is that generic HRQOL is not the same as individualised HRQOL in RA patients. Interestingly, this result is not exclusive to RA patients. Morris et al. (2006) identified in a study of patients undergoing major surgery that seven commonly used HRQOL PROMs, including the SF-36, would have failed to capture what these patients would have regarded as

being important themes in their HRQOL. This adds further evidence to the inclusion of PGOMs of HRQOL in research and clinical practice.

It may be argued that the difference in the results between these two measures was due to the uniqueness of this study. Items identified by participants in the PGI were the targets of intervention, and therefore the PGI would be more sensitive to change than the SF-36. Indeed, the effect size for the PGI was greater than those for the SF-36 subscales. As the effect sizes reflect of the relationship between the two measures of HRQOL and the individualised nature of the intervention we can conclude that the PGI was more sensitive to change than the SF-36. This result suggests that the approach of tailoring interventions may be a promising way to optimise perceived treatment effectiveness for the individual and further enhance a patient-centred approach to care. Indeed, several studies support a tailored approach to interventions, for example Sohl and Moyer (2007) report that women who received a tailored psychosocial intervention were more likely to get a mammogram than those who did not. Webb, Simmons, and Brandon (2005) demonstrated that tailoring interventions for smoking cessation results in greater success.

More specific to RA, Evers, Kraaimaat, van Riel, and de Jong (2002) conducted a trial of tailored cognitive behavioural therapy in early RA patients at risk of anxiety and clinical depression. Participant in this trial were able to chose from four different 'treatment modules' in pain and disability, fatigue, mood disorders, and social functioning problems. The modules available were based on what individual patients regarded as a priority. Following the tailored intervention the authors identified significant decreases in fatigue and depression at post-intervention which were maintained at six months follow-up. These studies combined with the results in the present study provide evidence for tailoring interventions. Utilising the PGI allows identification of areas which can be targeted for tailored interventions.

Finally, the study sought to explore any differences in the effectiveness of two psychosocial interventions, namely imagery and hypnotherapy. It was hypothesised that there would be a significant increase in HRQOL, measured by the PGI, in both the imagery and hypnotherapy groups and that because of the induction procedure involved in hypnotherapy and not imagery, the increase in HRQOL would be greater in the hypnotherapy group than the imagery group. The results of the present study support this hypothesis. Furthermore, the increase in HRQOL was maintained at six months follow-up. The inclusion of an induction procedure, which is similar to relaxation, in the hypnotherapy group may have contributed to the increased levels of HRQOL. Keefe et al. (1997) reported that RA patients who engaged in coping strategies involving relaxation reported better coping and less pain than those that did not. In order to identify whether the induction procedure in hypnotherapy contributed to the improved outcome future studies of hypnotherapy and imagery should consider using a relaxation control group in their design.

The post experimental questionnaire revealed no significant correlations between what participants hoped for, or expected, as a result of taking part in the study. This is surprising as expectation is believed to involve hope for improvement (Spiro, 1998) and is an influencing factor in the placebo effect (Mitchell, Laurent, & de Wit, 1986). Nevertheless, the results indicate that changes in HRQOL scores was not significantly related to variables in the post-experimental questionnaire. However, the post-experimental questionnaire was not administered until the end of the study at six months follow-up. It may be that participant's hopes and expectations changed from the start of the study, and perhaps if they were asked at the beginning there may have been significant correlations with changes in HRQOL.

Despite these promising results, the present study has several limitations. Within the design of this study the control group was a 'care-as-usual control group. Therefore, this group had significantly less contact with the experimenter than the intervention groups. This

raises concerns of experimenter effects confounding the results. However, because of time constraints, rather than add an additional control group with the same number of contact hours as the intervention groups, all participants were asked about perceived social support from the experimenter. Perceived social support is an important factor when living with a chronic condition (King, Willoughby, Specht, & Brown, 2006). Studies have shown that social support is associated with HRQOL (King, Cathers, Miller Polgar, MacKinnon, & Havens, 2000) and is a significant predictor of changes in HRQOL (Bennett et al., 2001). Indeed, perceived social support from the experimenter was significantly higher in both the intervention groups when compared to the control group. This was expected as each participant in the intervention groups spent on average nine hours more contact time with the experimenter than the control group. However, the perceived social support from the experimenter was significantly lower than perceived social support from either family or friends in all three groups. Furthermore, this increased perceived social support from the experimenter, in the intervention groups, was not correlated to changes in HRQOL scores measured by either the PGI or the SF-36. Therefore we can conclude that perceived social support from the experimenter was not significantly related to changes in HRQOL.

Another limitation of the present study was the low sample size. Unfortunately due to difficulties recruiting patients onto this study, the required calculated sample size was not achieved. However, the primary outcome measure was the PGI and the observed power was 0.987, this is indicative of sufficient sample size. The observed power of the SF-36 was low (mean observed power 0.45). Stevens (1996) suggests that when small sample sizes are involved the alpha value should be set to compensate for insufficient power values. If the significance alpha values were set from 0.05 to 0.1 there would have been a main effect for time in the social function and general health subscales of the SF-36. However post-hoc follow-up tests revealed these to be non-significant. A replication study with a larger sample

size may be able to test whether the low responsiveness of the SF-36 was because of insufficient power due to a small sample size.

In conclusion, the results of this study demonstrate that HRQOL PGOMs, such as the PGI, are important both in relation to research and clinical practice. The PGI is an effective tool for enhancing a patient-centred approach to treatment through identification of patient preferences. Furthermore, both imagery and hypnotherapy were effective psychosocial interventions for increasing HRQOL post-intervention, with hypnotherapy having longer term effects. The use of the PGI in the delivery of tailored psychosocial interventions such as imagery and hypnotherapy warrants further research. It may be that this patient-centred approach and use of psychosocial interventions will have HRQOL benefits for other chronic conditions. Given the results of this study, the limitations of fixed-item PROMs questionnaires, and the current debate as to whether generic or disease-specific measures should be used (Arnold et al., 2004) it is concluded that HRQOL PGOMs should also be considered in this debate.

CHAPTER FOUR

IMAGERY AND HYPNOTHERAPY

AS COMPLEMENTARY THERAPIES IN STABLE RHEUMATOID ARTHRITIS:

A RANDOMISED CONTROLLED STUDY²

² This research was presented as an oral presentation at the British Psychological Society Division of Health Psychology and European Health Psychology Society Annual Conference in September 2008, the abstract was accepted for publication: Bennett, B. M., Callow, N. & Jones, J. (2008). The use of imagery and hypnotherapy as complementary and alternative therapies in rheumatoid arthritis patients. *Psychology & Health*, 23 (suppl 1), 64-65.

Abstract

Objective. The objective of this study was to examine the efficacy of imagery and hypnotherapy as complementary therapies in patients with stable rheumatoid arthritis.

Method. Forty two participants with stable RA were randomised to an imagery intervention, hypnotherapy intervention, or 'care-as-usual' control group. Self-reported measures of pain, physical and mental fatigue, pain anxiety, arthritis self-efficacy, and functional disability, were collected at pre-intervention, six weeks post-intervention, and six months follow up. Participants in the imagery or hypnotherapy groups received six sessions over a six week period, followed by another three sessions over a six-month period.

Results. At six-week post-intervention both imagery and hypnotherapy groups reported significant decreases in pain. Additionally, the hypnotherapy group reported a significant decrease in physical fatigue, a significant increase in self-efficacy for controlling pain, and a significant decrease in functional disability. At six-month follow-up the hypnotherapy group maintained significantly increased self-efficacy for controlling pain, and significantly decreased functional disability. Clinically significant reductions were also achieved in physical and mental fatigue, and functional disability, for both groups at post-intervention and six months follow-up.

Conclusions. Given that imagery and hypnotherapy achieved clinically significant reductions in fatigue and functional disability these complementary therapies should be offered to patients with stable RA experiencing increased pain, fatigue, and functional disability.

Complementary therapies (CTs) are defined as health care practices which are not considered part of conventional medicine but complement it (Manheimer & Berman, 2008) by satisfying the needs of individuals which are not being met by conventional medicine (Ernst, 2004).

Practitioners of CTs adopt the view that health and disease should be conceptualised within a framework where the total person, including body, mind, and spirit, is the focus of an intervention, as opposed to the pathology of the illness or disease (Ben-Arye, Frenkel, Klein, & Scharf, 2008). Many CTs are now integrated within mainstream medicine (Zollman & Vickers, 1999), indeed in the UK, Thomas, Nicholl, and Fall (2001) report that at least 40% of General Practitioners referred patients to CT practitioners. The most commonly utilised CTs included osteopathy, chiropractic, acupuncture, homeopathy, and hypnotherapy (Harris & Rees, 2000; White, 1998).

The reasons individuals use CT include seeking a cure for illness and disease (Bell & Sikora, 1996), dissatisfaction with conventional medicine (Vincent & Furnham, 1996), perceived lack of efficacy, and concerns about side effects of orthodox medicine (Sharples, van Haselen, and Fisher, 2003). However, Thorne, Paterson, Russell, and Schultz (2002), report that individuals use CT as a way of assuming personal responsibility and self-management, rather than rejecting conventional medicine. Importantly, increased perceptions of personal responsibility can enhance perceived control over illness and disease, and increase general quality of life (Zandi, Abid-Hajbagheri, Memarian, Nejhad, & Alavian, 2005), which in turn has been associated with decreased pain and disability in patients where chronic pain is associated with their disease (Turner, Ersek, & Kemp, 2005).

Not surprisingly, CTs are frequently utilised by people with chronic disease (Scott, Kearney, Hummerston, & Molassiotis, 2005). Therefore, in the present study patients with long-

standing rheumatoid arthritis (RA) were invited to participate in a randomised trial investigating the effects of two CT's on psychosocial function. RA is a chronic inflammatory disease, primarily involving progressive inflammation of the synovium and destruction of articular cartilage where disease progression fluctuates and is unpredictable in both intensity and duration (Dixon & Symmons, 2005). Symptoms associated with the disease are joint pain, symmetric joint swelling, tenderness, morning stiffness, and generalised fatigue (Lee & Weinblatt, 2001) which results in varying degrees of functional disability (Griffiths, 2006).

Currently there is no cure for RA (Newman & Mulligan, 2004) and as a consequence medical treatment objectives are to manage and control the disease to reduce its disabling effects through the use of pharmacological treatments and physical rehabilitation (Combe, 2007). Although medication can often control the inflammation and slow the progression of disease, they are aggressive and can produce serious physical and psychological side effects (Gordon, Smith & Dhillon, 2007). In addition many patients continue to experience varied levels of pain, fatigue, and decreased levels of functional disability (Flato, Vinje, & Forre, 1998). Indeed, pain and fatigue are amongst the most commonly reported problems identified by patients with RA (Repping-Wuts, Uitterhoeveb, van Riela, & van Achterberg, 2008).

As a result of the chronic nature of the symptoms associated with RA and the negative side-effects of anti-rheumatic drugs, patients often turn to CT's to complement conventional treatments (Herman, Allen, Hunt, Prasad, & Brady, 2004). Indeed it is estimated that the prevalence of CT use in RA may be as high as 90% (Taibi & Bourguignon, 2003). Although there is a high prevalence of CT use, there is little research exploring their therapeutic effectiveness in this chronic disease. Consequently, the objective of this study was to examine

the effects of imagery and hypnotherapy, two CT's, on pain, fatigue, self-efficacy, pain anxiety, and functional disability in RA patients.

Imagery and hypnotherapy are considered CT's as they are not the conventional treatment from RA (Galantino, Boothroyd & Lucci, 2003). However, within the literature there is a degree of confusion between these two interventions. The terms hypnosis, hypnotherapy, guided imagery, and imagery are often used interchangeably and applied to both imagery and hypnotherapy (Zelter et al., 2002). With regard to the evidence base of these CT interventions, the confusion in terminology can cause complications as these two modalities might differ in therapeutic effectiveness. Consequently, a further objective of this study was to examine possible differences between imagery and hypnotherapy as a CT in stable RA patients.

Although imagery and hypnotherapy are similar cognitive therapeutic tools (Luskin et al., 2000) there is a procedural difference between them. During a hypnotic state it is assumed that the conscious mind is guided to become dormant while the unconscious mind becomes more ready and open to suggestion and imagery (Spiegel, Greenleaf, & Spiegel, 2000). This is achieved through an induction procedure involving relaxation and focussed attention (British Psychological Society, 2001), which is not involved in imagery. For the purposes of the present study, imagery is defined as the generation of images from at least one sensory modality for the purpose of evoking a psycho-physiological state (Astin, Shapiro, Eisenberg, & Forsys, 2003) and hypnotherapy is defined as 'a state of inwardly focussed attention in which the mind is focussed on ideas of therapeutic value that can potentiate psychophysiologic change' (Anbar, 2006, p.438).

In particular imagery combined with at least one other therapeutic modality (e.g. CBT, relaxation, music, and music) has shown to be an effective pain management technique in other

chronic disease, for example cancer (Roffe, Schmidt, & Ernst, 2005), and fibromyalgia (Hadhazy, Ezzo, Creamer, & Berman, 2000). Imagery interventions have also shown to be effective for reducing stress, anxiety, and depression in patients with breast cancer undergoing radiotherapy (Nunes et al., 2007), improving health related quality of life in patients with chronic tension headache (Mannix, Chandurkar, Rybicki, Tuesk, & Solomon, 1998), and reducing pain and mobility difficulties in patients with osteoarthritis (Baird & Sands, 2004).

Specifically in relation to RA, Astin, Beckner, Soeken, Hochberg, and Berman (2002) identified six studies which contained an element of imagery. The results identified that the combined imagery interventions were effective for reducing pain (Lavigne, Ross, Berry, Hayford, & Packman, 1992; O'Leary, Shoor, Korig, & Holman, 1988), and improving self-efficacy (O'Leary et al., 1988; Radojevic, Nicassio, & Weisman, 1992; Taal, Riemsma, Brus, & Seydel, 1993). However, as these interventions were multimodal, it is not possible to conclude the effectiveness of imagery as a single therapeutic modality in RA. Consequently, in order to investigate the effects of imagery as a singular modality, no other treatment modality was combined with imagery in the present study.

The other CT employed in this study, hypnotherapy has received renewed attention within the medical literature (Stewart, 2005) where there is evidence to indicate that this CT is useful for decreasing chronic pain (Jensen & Patterson, 2006; Abrahamsen, Baad-Hansen, & Svensson, 2008), improving post-operative wound healing time (Ginandes, Brooks, Sando, Jones, & Aker, 2003), and improving psychosocial functioning in cancer patients (Walker, 2004).

Despite the evidence for hypnotherapy as an effective adjunct treatment for many chronic conditions and disease, there is little research examining its effectiveness in RA. One notable

exception by Horton-hausknecht, Mitzdorf, and Melchart (2000) reported that patients using hypnotherapy achieved clinically significant decreases in disease activity and self-reported pain. However methodological flaws in this study require the results to be interpreted with caution. For example, participants chose which arm of the study they wanted to participate in, and the intervention was conducted in small groups. The results of this study may therefore be contaminated by confounding variables such as expectancy and social support. Furthermore, although the design of this study included a control group there was no between-group analysis. Therefore the results of this study, although promising, are inconclusive.

It is unclear how these CT's reduce pain, increase self-efficacy, and decrease functional disability (Baird & Sands, 2004; Christakou & Zervas, 2007). However, there are a number of theories which provide some insight into these mechanisms. Firstly, gate control theory (Melzack, 2001) may help to explain the reductions of pain associated with the use of imagery and hypnotherapy. Specifically, pain is modulated through the sensory discriminative and motivational affective systems in the brain. Imagery and hypnotherapy may reduce the extent to which pain is processed and perceived by refocusing attention to the content of the imagery rather than the pain. Indeed, in support of this Fors, Sexton and Götestam (2002) identified that distraction type imagery, where the individual imagines something pleasant, reduces pain more than when imagery related to the pain is used. Since pain is known to predict functional disability (Strating, van Schuur, & Suurmeijer, 2007) it can be hypothesised that a reduction in pain will result in decreased functional disability.

Secondly, the benefits of these CT's may also be explained through self-efficacy theory. Imagery and hypnotherapy have the potential to provide mastery and vicarious experiences, two sources of information which Bandura (1977) stated had the ability to increase self-efficacy.

Repeated use of imagery may provide a platform for mental rehearsal of movements with a reduction in mobility-related symptoms (Pfurtscheller, Neuper, Ramoser, & Muller-Gerking, 1999). For example, if an individual uses imagery, with or without hypnosis, to visualise a task, such as walking 100m with no problems, then their belief that they can accomplish that task successfully should increase. As a result of increased self-efficacy there is an expectation that the desired outcome will be achieved (Pfeifer & Beard, 1997), thus reducing perceived functional disability.

Finally, a theory which may explain behavioural change following an imagery or hypnotherapy intervention comes from Cautela and Kearney (1990). They propose that there are three types of behaviour. Overt behaviour is that which is observable, covert behaviour which is internal and related to thoughts, and physiological behaviour which relates to physical processes, such as breathing and heart rate. Imagery and hypnotherapy can be considered as covert behaviours. The assumptions related to this theory include functional equivalence, interaction, and universal influence. Functional equivalence, as proposed by Cautela et al. (1990), refers to behaviour modification through operant conditioning. The interaction assumption suggests that as one type of behaviour is changed the other types of behaviour are also changed. Finally, universal influence refers to when one behaviour type is reinforced then the other types of behaviour are also reinforced in the same direction. Therefore, when a task is performed through covert behaviour, using imagery or hypnotherapy, the assumption is that overt behaviour will also be reinforced.

Previous research using imagery and hypnotherapy, and the assumptions of the theories above identify potential areas which should be considered as targets for CT intervention, and include pain, self-efficacy, and functional disability. In RA, research has also identified that pain

is related to pain anxiety (Zautra, Burleson, Matt, Roth, & Burrows, 1994), therefore if these interventions have the ability to decrease pain they may well decrease pain anxiety. Furthermore, Pollard, Choy, Gonzalez, Khoshaba, & Scott (2006) have demonstrated that pain and functional disability are determinants of fatigue. Therefore, if pain and functional disability are reduced we should also expect a decrease in fatigue.

In summary, the objective of this study was to examine the effectiveness of imagery and hypnotherapy in RA patients, specifically focussing on the areas of pain, fatigue, pain anxiety, self-efficacy and functional disability as dependent variables. A further objective was to examine any possible differences between these two CT's. It was hypothesised that there would be significant psychosocial improvement in all of the dependent variables, and due to the additional induction procedure in hypnotherapy, it was further hypothesised that hypnotherapy would produce greater improvement than imagery.

Method

The methods of this study, including sample size calculation and randomisation, are described in detail in chapter three of this thesis. Briefly, 42 patients with stable RA participated in this randomised controlled intervention trial. Participants were randomised to an imagery intervention, a hypnotherapy intervention, or 'care-as-usual' control group. Dependent variables were measured at pre-intervention, six-week post-intervention and six-month follow-up. Participants in the imagery and hypnotherapy group received six intervention sessions over a six-week period, followed by a further three intervention sessions over the next six months. During the intervention sessions the imagery group were not given any instructions to relax. Participants in these groups also received a CD in which they could practice on a daily basis. Participants in the control group received usual routine care with no additional intervention during the first six

weeks or the following six-months, however they were invited to have the intervention of their choice at the end of the control period.

Measurements

The dependent variables measured in this study were pain, physical and mental fatigue, pain anxiety, self-efficacy, and functional disability. Health-related quality of life (HRQOL) was also measured using a generic fixed-item measure, the Short Form 36 Health Survey Questionnaire (SF-36; Ware & Sherbourne, 1992) and an individualised measure, the Patient Generated Index (PGI; Ruta, Garratt, Leng, Russell, & MacDonald, 1994). The results of the HRQOL measures are presented in chapter three of this thesis.

Pain. A visual analogue scale (VAS) was used to measure perceived pain levels. The VAS was 100mm with endpoints labelled, '*no pain*' and '*pain as bad as it can be*'. Higher scores represent greater levels of perceived pain. The VAS is widely used in pain research and has found to have good validity and reliability (Huskisson, 1983). Changes greater than 20mm are considered clinically significant in RA (Wolfe, Hawley, & Wilson, 1996).

Fatigue. Physical and mental fatigue were both measured separately using a 100mm VAS with the endpoints were labelled 'no fatigue' or 'fatigue as bad as it can be'. Wolfe (2004) has shown the VAS to be a reliable measure for fatigue in RA. Decreases greater than 8.2mm are considered clinically significant improvement, whereas increases greater than 11.3mm are considered clinically significant deterioration in RA (Khanna et al., 2008).

Pain anxiety. Pain anxiety was assessed using the short form pain anxiety symptoms scale (PASS-20; McCracken, & Dhingra, 2002). The PASS-20 contains 4 subscales including cognitive anxiety, physiological anxiety, fearful appraisal of pain, and escape avoidance. Items in

the PASS-20 are scored from 0 (never) to 5 (always). The PASS-20 has shown good reliability and validity with the longer 40 item version (McCracken et al., 2002).

Self-efficacy. Self-efficacy was measured using the Arthritis Self-Efficacy Scale (ASES; Lorig, Chastain, Ung, Shoor, & Holman, 1989). The ASES contains three subscales relating to self-efficacy in relation to controlling pain, function, and an 'other symptoms scale'. Each of the scales starts with the phrase, "*How confident are you that you can...*". Participants rate their responses on a 10 point likert scale. In total there are 28 items. Higher scores indicate greater self-efficacy for each specific subscale. The ASES has demonstrated good psychometric properties in a RA population (Barlow, Williams, & Wright, 1997). The pain and function scales were the only scales used in this study.

Functional disability. Functional disability was measured using the Health Assessment Questionnaire (HAQ; Fries, Spitz, Kraines, & Holman, 1980). The HAQ is a brief self-administered questionnaire designed specifically for use in RA patients. It contains 8 domains of function, each relating to activities of daily living. The results of each of the 8 subscales are reported on a 0-3 scale, where scores of 0 represent no functional disability and scores of 3 represent the worst functional disability. The HAQ has been used extensively in RA studies, and has been shown to be effective and sensitive to deterioration in RA (Devlin et al., 1997). Changes of 0.25 or greater in RA patients are considered clinically significant (Wolfe & Pincus, 1999).

Post-experimental questionnaire. A post experimental questionnaire was administered after the six month follow-up to obtain information about the effects of hope, expectation, and reaction to randomisation. Hope and expectation were measured with a 100mm visual analogue scale, which was anchored with the statements '*no change*' and '*a lot of change*' at opposite

ends. Initial reaction to randomisation was measured using a 100mm visual analogue scale with the anchors '*very dissatisfied*' and '*very satisfied*'. Participants were asked about the frequency of using the CD's of the intervention, and how easy it was to schedule the intervention into their daily life routine. Analyses of these variables would then show if there was any confounding effects.

Manipulation check. As social support has been shown to have a beneficial affect on pain (Evers, Kraaimaat, Geenen, Jacobs, & Bijlsma, 2003), fatigue (Riemsma, Rasker, Taal, Griep, Wouters, & Wiegman, 1998), self-efficacy (Taal, Rasker, Seydel, & Wiegman, 1993), and functional disability (Evers et al., 2003) on patients with RA a modified version of the perceived social support scale (PSS; Procidano & Heller, 1983) to include social support from the experimenter was also used to examine possible experimenter effects. Scores on the perceived social support scale range from +20 to -20 where higher scores indicate greater perceived social support.

Data Analyses

Patient characteristics. Univariate statistics (means and standard deviations) were used to examine participant characteristics. One-way ANOVA were conducted to examine any differences in patient characteristics between the groups. The assumptions of normality and homogeneity of variance were not violated.

Analyses of dependent variables. A series of one-way analysis of variance were conducted on all dependent variables to investigate differences between the groups at pre-intervention. As there were no significant differences between the groups, a series of two-way analysis of variance were then conducted to investigate possible differences between the groups at six-week post-intervention and six-month follow-up for each of the dependent variables. The

assumptions of normality, homogeneity of variance, and homogeneity of inter-correlations were not violated. Significance was accepted as $p < 0.05$ (one-tailed tests). Tukeys test was employed as a post hoc procedure. Clinically significant change was also reported where published data was available for each of the dependant variables. Furthermore, where change was identified as being clinically significant the clinical effect size was calculated and reported. Felson, Anderson, and Meenan (1990) suggest that in order to calculate the clinical effect size the change in the mean, from pre- to post-intervention and pre-intervention to follow-up, is divided by the standard deviation of pre-intervention values. According to Cohen (1977) small clinically meaningful changes have an effect size between 0.2 and 0.49, moderate clinically meaningful changes have an effect size between 0.5 and 0.79, and large clinically meaningful changes have effect sizes greater than 0.8.

Post experimental questionnaire. A series of one-way ANOVAs were conducted on expectation, hope, initial reaction to randomisation, and independent samples t-test on frequency of use of CD to assess whether there were any differences between the groups. Where any difference was identified, follow-up correlation analyses were conducted to assess the relationship between these variables and changes in scores in the dependent variables at post-intervention and follow-up.

Manipulation check. Perceived social support from the experimenter was used as a manipulation check. This was thought essential as the literature indicates that additional social support may confound the results of outcome measurement in intervention studies (Evers et al., 2003; Riemsma et al., 1998; Taal et al., 1993). Mann-Whitney tests were conducted to investigate the differences in perceived social support received from the experimenter between the groups. Spearman's rho correlations were conducted to investigate the relationship between

the perceived social support received from the experimenter and scores on each of the dependent variables.

Results

Patient Characteristics

A total of 136 patients with RA were invited to participate in this study. Forty two patients who met the criteria agreed to participate and completed all stages of the study. Thirty participants were female. The mean age of participants was 59 years ($sd=9.1$) and there were no significant differences in age within the three groups. The majority of participants (83%) were either married or living as married. Three participants were widowed, three were divorced and one participant was single. The mean disease duration was 160 months ($sd=104$) and there were no significant differences in disease duration between the three groups. Patient characteristics and pre-intervention values of all dependent variables are presented in table 12.

Table 12. Patient characteristics at pre-intervention (mean, standard deviation, 95% CI lower-upper limits)

	Imagery	Hypnotherapy	Control
Age (years)	57.7 (9.6) 52.1 - 63.2	59.9 (8.7) 54.8 - 64.9	59.1 (9.5) 53.6 - 64.6
Disease duration (months)	182.7 (133.3) 105 - 259	106.4 (59.3) 72 - 104	190.4 (90.4) 138 - 242
Pain (0-100)	44.4 (25.1) 29.8 - 58.8	37.9 (17.2) 28.0 - 47.8	45.3 (20.2) 33.6 - 56.9
Physical fatigue (0-100)	57.5 (21.5) 45.0 - 69.9	43.8 (17.9) 33.4 - 54.1	47.3 (19.1) 36.2 - 58.3
Mental fatigue(0-100)	39.3 (28.1) 23.0 - 55.5	35.9 (24.7) 21.7 - 50.6	39.6 (22.0) 26.8 - 52.3
Pain anxiety (0-100)	35.9 (22.4) 22.9 - 48.8	35.7 (8.8) 30.6 - 40.8	30.6 (11.0) 24.2 - 36.9
Self-efficacy-pain (0-50)	23.8 (4.9) 20.9 - 26.6	26.5 (10.2) 20.6 - 32.4	26.9 (8.0) 22.2 - 31.5
Self-efficacy-function (0-90)	53.1 (17.9) 42.7 - 63.4	59.8 (16.6) 50.3 - 69.4	50.6 (17.1) 40.7 - 60.4
Functional disability (0-3)	1.73 (0.7) 1.32 - 2.12	1.29 (0.95) 0.75 - 1.85	2.03 (0.8) 1.60 - 2.45

Dependent Variables.

Table 13 provides a summary of scores on dependent variables over time. Significant within-group changes over time and clinically significant changes are identified.

Pain. A two-way repeated measures ANOVA revealed a significant effect for time, $F(2, 78)=5.83, p<.005, \eta^2=0.13$ and group $F(2,39)=4.59, p<.05, \eta^2=0.19$. Of more central interest was a significant interaction, $F(4,78)=2.66, p<.05, \eta^2=0.12$. Follow-up tests revealed a significant

difference between the groups at post-intervention, $F(2, 357) = 10.22, p < 0.005, \eta^2 = .34$. Post hoc comparisons using Tukeys test indicated that both the imagery group and the hypnotherapy group were significantly lower than the control group ($p < 0.05$ and $p < 0.005$ respectively) with no significant difference between the imagery and hypnotherapy groups. However, at follow-up there were no significant differences between any of the groups. Additionally, neither imagery nor hypnotherapy achieved clinically significant reductions in pain.

Physical fatigue. A two-way repeated measures ANOVA revealed a significant effect for time, $F(2, 78) = 5.88, p < 0.005, \eta^2 = 0.13$ with no effect for group. However, there was a significant interaction, $F(4, 78) = 3.78, p < 0.05, \eta^2 = 0.16$. Follow-up test revealed a significant difference at between the groups at post-intervention, $F(2, 419) = 5.49, p < 0.05, \eta^2 = 0.22$. Post hoc comparisons using Tukeys test indicated that at post-intervention the hypnotherapy group scored significantly lower than the control group ($p < 0.05$). The imagery group did not differ significantly from the control group. Follow-up tests further revealed no significant differences between the groups at follow-up. Although there were no significant differences between the groups at follow-up, both intervention groups achieved a clinically significant reduction in physical fatigue and the control group did not. The clinical effect sizes for imagery and physical fatigue were 0.84 at post-intervention and 0.66 at follow-up. Clinical effect sizes for hypnotherapy and reduction in physical fatigue were 0.83 at post-intervention and 0.62 at follow-up. The clinical effect sizes for imagery and hypnotherapy on reducing physical fatigue at post-intervention were large, however these become moderate at follow-up.

Mental fatigue. A two-way repeated measures ANOVA revealed a significant effect for time, $F(2, 78) = 5.59, p = 0.005, \eta^2 = 0.12$ with no effect for group and no significant interaction. Although there was a significant decrease in mental fatigue scores from pre- to post-intervention

and from pre-intervention to follow-up, there were no significant differences between the groups. Despite there being no significant differences between the groups at post-intervention and follow-up, both intervention groups achieved clinically significant reductions in mental fatigue, and the control group did not. Clinical effect sizes for imagery and mental fatigue were 0.30 at post-intervention and 0.34 at follow-up. The effect sizes indicate small clinically meaningful reductions in mental fatigue for imagery. Clinical effect sizes for hypnotherapy and mental fatigue were 0.63 at post-intervention and 0.38 at follow-up. Hypnotherapy had a moderate clinically meaningful reduction in mental fatigue at post-intervention which became small at follow-up.

Pain anxiety. A two-way repeated measures ANOVA revealed a significant effect for time, $F(2, 78)=20.38, p<0.001, \eta^2=0.34$ with no effect for group. However, there was a significant interaction, $F(4, 78)=5.35, p=0.001, \eta^2=0.21$. Follow-up tests revealed that scores on pain anxiety decreased significantly from pre- to post-intervention and from pre-intervention to follow-up, however there were no differences between the groups. As there is no published data on clinically significant change in pain anxiety clinical effect sizes were not calculated.

Table 13. Within-group analyses of psychosocial function over time [means and (standard deviation) and change scores]

		Pain	Physical Fatigue	Mental Fatigue	Pain Anxiety	Self-Efficacy		Functional Disability
		(0-100)	(0-100)	(0-100)	(0-100)	Pain (0-50)	Function (0-90)	(0-3)
Imagery	Pre	44.4 (25.1)	57.5 (21.5)	39.3 (28.1)	35.8 (22.4)	23.8 (4.9)	53.1 (17.9)	1.73 (0.69)
	Post	34.3 (18.8)	39.4 (20.0) ^{ab}	30.8 (25.6) ^{ab}	27.1 (17.9) ^b	32.8 (10.0) ^b	58.5 (21.5)	1.48 (0.80) ^a
	FU	31.4 (19.1) ^b	43.4 (20.8) ^{ab}	29.8 (26.2) ^{ab}	25.7 (18.1) ^b	28.2 (9.2)	54.5 (20.0)	1.45 (0.82) ^{ab}
		-13.0	-14.1	-9.5	-10.1	+4.4	+1.4	-0.28
Hypnotherapy	Pre	37.9 (17.2)	43.8 (17.9)	35.9 (24.7)	35.7 (8.8)	26.5 (10.2)	59.8 (16.6)	1.29 (0.95)
	Post	20.3 (15.1) ^b	28.9 (16.5) ^{ab}	20.4 (17.6) ^{ab}	22.8 (9.4) ^b	38.1 (11.9) ^b	67.1 (19.1)	0.91 (0.74) ^{ab}
	FU	23.1 (17.2) ^b	32.7 (15.0) ^a	26.5 (17.4) ^a	21.4 (9.9) ^b	37.6 (10.5) ^b	68.1 (17.6)	0.83 (0.75) ^{ab}
		-14.8	-11.1	-9.4	-14.3	+11.1	+8.3	-0.46
Control	Pre	45.3 (20.2)	47.3 (19.1)	39.6 (22.0)	30.3 (10.9)	26.9 (7.9)	50.6 (17.1)	2.03 (0.75)
	Post	52.5 (22.1)	54.4 (24.2)	38.3 (23.8)	32.6 (15.2)	26.4 (9.8)	49.6 (17.9)	2.11 (0.81)
	FU	40.6 (26.8)	46.8 (28.1)	33.4 (27.8)	28.4 (14.4)	29.8 (10.7)	54.3 (19.4)	1.94 (0.97)
		-4.7	-0.5	-6.2	-2.5	+2.9	+3.7	-0.09

^a Clinically significant improvement from pre-intervention

^b Statistically significant improvement from pre-intervention (with Bonferroni correction applied)

Self-efficacy-pain. A two-way repeated measures ANOVA revealed a significant effect for time $F(2, 78)=10.82, p<0.001, \eta^2=0.22$ with an effect for group approaching significance, $F(2,39)=3.01, p=0.06, \eta^2=0.13$. Of more central interest was a significant interaction $F(4, 78)=3.28, p<0.05, \eta^2=0.14$. As the effect for group was approaching significance and there was a significant interaction follow-up tests were performed for group and time. Follow-up tests revealed a significant difference between the groups at post-intervention, $F(2,112)=4.22, p<0.05, \eta^2=0.18$ and follow-up, $F(2,103)=3.44, p<0.05, \eta^2=0.15$. Post hoc comparison using Tukeys test indicated that hypnotherapy group scored significantly higher than the control group ($p<0.05$). The imagery group did not differ significantly from the control group at post-intervention. At follow-up, post hoc Tukeys test revealed the hypnotherapy group scored significantly higher than the imagery group ($p<0.05$). The control group did not differ significantly from the imagery group. As there is no published data on clinically significant change in self-efficacy for controlling pain, clinical effect sizes were not calculated.

Self-efficacy-function. A two-way repeated measures ANOVA revealed a significant effect for time, $F(2, 78)=3.67, p<0.05, \eta^2=0.09$, no effect for group, and no significant interaction. Although scores on self-efficacy for functioning increased significantly from pre- to post-intervention and from pre-intervention to follow-up, there were no significant differences between the groups. As there is no published data on clinically significant change in self-efficacy for function, clinical effect sizes were not calculated.

Functional disability. A two-way repeated measures ANOVA revealed a significant effect for time, $F(2, 78)=7.56, p<0.005, \eta^2=0.16$ and group, $F(2, 39)=6.11, p=0.005, \eta^2=0.24$, however there was no significant interaction. Follow-up tests revealed a significant difference between the groups at post-intervention, $F(2,0.62)=8.18, p=0.001, \eta^2=0.30$ and follow-up,

$F(2,0.73)=5.92, p<0.01, \eta^2=0.23$. Post hoc comparison using Tukeys test indicated that hypnotherapy group scored significantly lower than the control group ($p<0.001$). The imagery group did not differ significantly from the control group at post-intervention. At follow-up, post hoc Tukeys test revealed the hypnotherapy group scored significantly lower than the control group ($p<0.005$). The imagery group did not differ significantly from the control group at follow-up. Although only the hypnotherapy group achieved statistically significant reductions in functional disability, both intervention groups achieved clinically significant decreases in functional disability at post-intervention which was maintained at follow-up. The clinical effect sizes observed were 0.36 at post-intervention and 0.40 at follow-up for the imagery group, and 0.40 at post-intervention and 0.48 at follow-up for the hypnotherapy group. The effect sizes indicate a small clinically meaningful reduction in functional disability.

Post experimental questionnaire. There were no significant differences between the three groups in what participants expected would happen to their disease by taking part in this study. However, the control group scored significantly lower than the hypnotherapy group on what they hoped would happen ($p=0.04$). Follow-up correlation analyses revealed there was a significant positive relationship between what participants hoped would happen as a result of taking part in the study and scores in functional disability ($p<0.05$). This result indicates that the greater hope a person had that their condition would improve by taking part in this study then they were more likely to report higher decreases in functional disability.

The control group also scored significantly lower than both intervention groups on their reaction to the randomisation process ($p<0.001$). Follow-up correlation analyses revealed significant positive relationships between participants reaction to randomisation and scores of

physical fatigue ($p < 0.05$), and scores in functional disability ($p < 0.05$). This result indicates that the more satisfied an individual was with the group they were randomised to, they were more likely to report greater improvement in physical fatigue and functional disability. No significant differences were found between the two intervention groups and the frequency in which they practiced the intervention during the six weeks post-intervention and six month follow-up.

Manipulation check. Perceived social support received from the experimenter was significantly lower than social support received from either family or friends ($\chi^2 = 58.908$, $p < 0.005$). Perceived social support received from the experimenter was significantly higher ($Z = -3.204$, $p < 0.001$ and $Z = -3.54$, $p < 0.001$) in the imagery and hypnotherapy group when compared to the control group and there were no significant differences between imagery and hypnotherapy group. Follow-up correlation analyses revealed significant positive relationships between changes in pain scores (pre-intervention to follow-up; $p < 0.05$), changes in functional disability scores (pre-intervention to post-intervention; $p < 0.05$) and perceived social support from the experimenter. This result suggests that there was a significant relationship between pain and social support from the experimenter, and functional disability and social support from the experimenter.

Discussion

Although the use of CT's by people with RA is high (Taibi et al., 2003), little is known of the effectiveness of imagery and hypnotherapy. The present study set out to explore whether these two CTs were beneficial in stable RA patients, and if there were any differences between the two interventions. It was hypothesised that both interventions would have beneficial effects on pain, fatigue, pain anxiety, self-efficacy, and functional disability. Additionally, due to its

induction procedure it was hypothesised that the hypnotherapy intervention would have greater beneficial effect than imagery which has no induction.

While both interventions had some effect on psychosocial function in stable RA patients, hypnotherapy was statistically more effective than an imagery intervention and care-as-usual. Hypnotherapy significantly reduced pain, physical fatigue, increased self-efficacy for controlling pain, and decreased functional disability at six-week post-intervention when compared to an imagery intervention and care-as-usual control group. Furthermore, significant improvement in self-efficacy for controlling pain and decreased functional disability was maintained at follow-up when compared to an imagery intervention and care-as-usual control group. The only statistically significant result for the imagery intervention was reduced pain post-intervention when compared to a care-as-usual control group. These key findings partially support the hypotheses.

Additionally both imagery and hypnotherapy achieved clinically significant reductions in mental and physical fatigue and decreased functional disability. Both statistical and clinical significance should be regarded together in clinical trials. First, statistical significance informs us whether there was a significant difference in numerical values obtained from dependant measures between or within groups. This is important as researchers and clinicians need to know whether there was any difference between two or more groups outcome. Clinical significance is defined as “the noticeable difference an intervention makes in the everyday life of patients or to others with whom the patients interact” (Kazdin, 1999, p. 323). Furthermore, not only do we need to know if any statistical difference exists, but whether these difference have a noticeable impact on the functioning of the patient. This is where clinical significance is important.

The results of this study indicate that in some cases, for example mental fatigue, there was no statistical difference between the interventions and the control group, yet there was a

clinically significant difference. This poses a dilemma for researchers and clinicians. From a research perspective the use of imagery and hypnotherapy to decrease mental fatigue in RA patients is statistically no better than no intervention, however from a clinical perspective both these interventions make a noticeable difference in mental fatigue in patients with RA.

The results for the imagery group in the present study are similar to those reported in the literature. For example, Leibling, Pfingsten, Bartmann, Rueger, and Schuessler (1999) report that an imagery intervention combined with pain management and active coping skills resulted in decreased pain, disability, and increased self-efficacy post-intervention, however at follow-up there were no significant differences between their intervention and control group. Additionally Astin et al. (2002) reported that interventions employing imagery with another modality resulted in significant psychosocial improvement at post-intervention, however at follow-up the improvement became non-significant.

With regard to the difference in results between the two CT's employed in this study, firstly the procedural difference between imagery and hypnotherapy should be taken into consideration. The induction procedure in hypnotherapy involves instructions for deep relaxation and focussed attention (British Psychological Society, 2001). As hypnotherapy includes imagery and this induction procedure, then a possible reason why this group achieved better outcomes may be because of the induction procedure. However, as no published research has examined the use of imagery with and without deep relaxation specifically in RA patients then future trials may want to consider investigating this and compare it to hypnotherapy.

Secondly, the differences between imagery and hypnotherapy may be due to the influence of the placebo effect. Gandhi and Oakley (2005) investigated the use of the word 'hypnosis' and 'relaxation' in a hypnotic induction procedure. They found that when participants

were told the procedure was 'hypnosis', measures of behavioural and subjective responsiveness to suggestibility increased significantly more than when participants were told the same procedure was 'relaxation'. They concluded that the word 'hypnosis' had a powerful effect on outcome. Within the present study participants in the hypnotherapy group were told that they would receive hypnotherapy. Based on the finding of Gandhi et al. (2005), the results in the hypnotherapy group may be due to the placebo effect.

Thirdly, there is evidence that individuals who have a greater imagery ability and hypnotic susceptibility achieve better outcome (Ogston et al., 1997; Appel & Bleiberg, 2005). In the present study imagery ability and hypnotic susceptibility were not measured. It may be possible that participants in the imagery group had low imagery ability and those in the hypnotherapy group has high hypnotic susceptibility. This would help to explain the differences between these two interventions.

Although the results from this study are promising, and indicate hypnotherapy is a beneficially therapeutic complement to conventional treatment of RA, there are several limitations of the present study. The results demonstrate statistically significant reductions in pain at post-intervention these results were obtained from a subjective measure. However, anecdotal evidence from some participants suggests that they did decrease the amount of pain medication they took. Future studies should examine the amount of pain medication taken throughout the duration of the study as this would provided more concrete evidence for the analgesic effect of these two interventions.

A primary concern within the methodology of the present study was the possibility that perceived social support from the experimenter may have contaminated the results. King, Willoughby, Specht, and Brown (2006) have suggested social support is an important factor in

adapting to adversity, including living with a chronic condition. Indeed, studies have shown that social support can affect long-term functional disability and pain in early RA (Evers et al., 2003).

In the present study perceived social support from the experimenter was higher in both the intervention groups when compared to the control group. This was expected to be the case as each participant in these groups spent on average nine hours more contact time with the experimenter than the control group. Although, perceived social support was higher in both intervention groups it was significantly lower than perceived social support from either family or friends in all three groups. However, significant correlations between social support from the experimenter, pain reduction, and decreased functional disability were identified. This indicates that social support from the experimenter may have contributed to decreased pain and functional disability, and not the CT's. Future research should include a control group where participants have the same amount of contact time as the intervention groups.

The post-experiment questionnaire revealed significant correlations between reaction to randomisation and decreased physical fatigue, and decreased functional disability. Participants in the control group were less satisfied than participants in the intervention groups about the group they were randomised to. Their initial reaction to randomisation may have had a negative impact on psychosocial function. Indeed, Holtzman, Newth, and Delongis (2004) reported that disappointment is associated with maladaptive coping in RA. However, in the present study when participants in the control group were informed of randomisation, they were also told that they could receive either sessions in imagery or hypnotherapy after the control period. No participant in the control group declined this offer. More importantly, no participants in the control group dropped out of the study. This suggests that participants in the control group were not too dissatisfied.

Another limitation of the present study is the sample of RA patients who participated in the study. These participants were people who had lived with RA for a long time, on average over thirteen years, and their disease was considered to be stable with their medication.

Throughout the literature there is evidence to suggest that interventions are not as effective in chronic progressive disease as they are in early disease (Kraaimaat, Brons, Geenen, & Biljsma, 1995). Specifically, it is suggested that within two years of diagnosis provides the optimum opportunity to treat the disease (Emery, 1995; Devlin et al., 1997). Sharpe, Sensky, Timberlake, Ryan, and Allard (2003) have shown that a multimodal cognitive behaviour therapy with standard clinical care in recently diagnosed RA patients result in improvement for both physical and psychological outcomes, which were maintained 18 months follow-up. Future studies may want to investigate possible therapeutic differences using imagery and hypnotherapy between early and late stage RA.

In conclusion, the results of this study present evidence both interventions providing some psychosocial improvement in the short-term, specifically in statistically reduced pain and clinically significant reduced fatigue. Additionally, hypnotherapy demonstrated longer-term beneficial effects. There are clinical implications of this research. Imagery and hypnotherapy should be considered as routine adjunct treatments for pain relief in RA patients. Specifically, RA patients often experience a flare in their arthritis, which can cause a high level of pain. By offering patients the option of including imagery or hypnotherapy in their routine clinical care, they will be given the opportunity to take personal responsibility in the self-management of their disease. Furthermore, given the maintained clinically significant improvements in the present study, hypnotherapy should be considered in the long-term routine care of RA patients.

CHAPTER FIVE

ACTIVE RHEUMATOID ARTHRITIS: A SERIES OF CASE STUDIES INVESTIGATING HYPNOTHERAPY AND IMAGERY WITHIN A BIOPSYCHOSOCIAL FRAMEWORK.³

³ This research was accepted as a poster presentation at the British Society of Rheumatology and British Health Professionals in Rheumatology joint Annual Conference in April 2009, and the abstract was accepted for publication: Bennett, B. M., Callow, N. & Jones, J. G. (2009). Active rheumatoid arthritis: A case study approach investigating hypnotherapy and imagery within a biopsychosocial framework. *Rheumatology*, 48 (suppl 1), i63-i64.

Abstract

Objective. Within a biopsychosocial framework it is assumed that psychological, social, and biological factors interact with each other. An objective of this study was to test this theoretical assumption in patients with active RA. Previously, imagery and hypnotherapy demonstrated psychosocial improvement in stable RA patients. Given positive changes in the psychological system of this model it was hypothesised that there would be beneficial changes in disease activity.

Method. Ten patients with active RA received a two week intervention of either hypnotherapy or imagery. All participants received six intervention sessions based on what they identified as being important aspects of their life affected by the disease. The biological outcome measures were ESR, CRP and DAS28. Psychosocial measures included pain, fatigue, pain anxiety, self-efficacy, and functional disability. Measures were obtained pre- and post-intervention. The EULAR DAS28 response criteria were used to decide whether biological improvement had occurred.

Results. There were several areas of improvement in clinical assessment, with the DAS28 of six patients showing a moderate response to the intervention in accordance with EULAR response criteria. Additionally, participants reported improvement in psychosocial function with clinically significant reductions in pain and fatigue in some cases, and reductions in HAQ in all ten participants.

Conclusions. Psychosocial improvement coincided with a moderate improvement in clinical outcomes of disease activity in six out of ten patients. However, the small numbers and the natural tendency of a flare in RA to improve mean these results should be interpreted with caution. However there is a suggestion that as well as improving psychosocial function, these psychosocial interventions may have influenced biological outcome measures and possibly the disease process.

Rheumatoid arthritis (RA) is a chronic disease which has a physical, social, and psychological impact on the patient (Uhlig, Loge, Kristiansen, & Kvien, 2007). It is a disease primarily involving progressive inflammation of the synovial tissue lining the joints and destruction of articular cartilage (Dixon & Symmons, 2005). Symptoms associated with the disease are joint pain, swelling, tenderness, and generalised fatigue (Lee & Weinblatt, 2001) which results in varying degrees of functional disability (Griffiths, 2006). RA is also associated with unpredictable acute painful flare-ups (Strahl, Kleinknecht, & Dinnel, 2000), which have been shown to cause further progressive joint damage with increased disability and associated pain anxiety (Zautra, Burleson, Matt, Roth, & Burrows, 1994). With no known cure (Newman & Milligan, 2004) current medical objectives are to control the disease and minimise disability using pharmacological interventions such as disease-modifying antirheumatic drug (DMARD) therapy (Combe, 2007).

Patients with RA may present with very similar clinical measures of disease activity, severity, and swollen and tender joints, yet have very different degrees of disability (Barlow, Cullen, & Rowe, 2002). The discrepancy between disease activity and the resultant disability indicates the limitations of applying the biomedical model of disease in RA. Indeed, the biomedical model ignores non-disease factors such as demographic characteristics and psychosocial variables which can contribute to overall outcome of disease (Foster et al., 2003).

In order to account for this discrepancy researchers have explored a biopsychosocial model of disease for RA. In support of this theoretical transition, Walker, Littlejohn, Jackson, and Dudgeon (2005) reported that the biopsychosocial model accounted for more variance in disability in RA than the traditional biomedical model. Specifically, the biomedical model could only account for 39% of the variance in basic activities of daily living, compared to 51% predicted by the biopsychosocial model.

The biopsychosocial model also provides a systems perspective of RA, in that, changes in one part of the system can produce changes in the other parts of that system (Keefe et al, 2002). For example, increases in the number of swollen joints and elevated inflammatory markers (the biology subsystem) can lead to increased pain, anxiety, and decreased self-efficacy (the psychology subsystem), which may result in a decrease in the amount of time spent in leisure activities (the social subsystem). Applying a biopsychosocial model in context of the disease-disability pathway of RA, Escalante and del Rincon (1999) identified several variables, including the main disease pathway, which contributed to overall disability. External modifiers, including pain, anxiety, fatigue, and self-efficacy, are biopsychosocial variables which may have a reciprocal relationship to pathology, impairment, functional limitations, and eventual disability.

In relation to these external modifiers, Schoenfeld-Smith et al. (1996) demonstrated that pain had a greater mediating influence on the development of disability in RA patients, than the direct effects of the disease activity. Additionally, they found pain had a direct influence on both psychological and physical disability, as well as being related to pain anxiety. Unpredictable painful flare-ups associated with RA make these patients more susceptible to pain anxiety (Zautra et al., 1994). Furthermore, Strahl et al. (2000) demonstrated that pain anxiety is independently associated with function and increased disability.

Pain has also been related to self-efficacy. Lefebvre et al. (1999) reported that scores on the arthritis self-efficacy scale (ASES; Lorig, Chastain, Ung, Shoor, & Holman, 1989) could explain an additional 28% of the variance in daily joint pain of RA patients. Additionally, Brekke, Hjortdahl, & Kvein (2001) concluded that baseline scores of self-efficacy influenced changes in health status over a two year period. More recently, 'personal mastery' which is synonymous with self-efficacy has been shown to predict levels of stress, pain, and fatigue in RA (Younger, Finan, Zautra, Davis, & Reich, 2008). Fatigue is reported by RA patients as being

one of the most bothersome symptoms associated with the disease (Pollard, Choy, Gonzalez, Khoshaba, & Scott, 2006). It has also been noted that levels of fatigue increase during painful flare-ups and decrease during remission (Pinals, Masi, & Larsen, 1981). Studies have shown fatigue to be affected by demographic, psychosocial, and clinical characteristics of disease in RA patients (Mancuso, Rincon, Sayles, & Paget, 2006).

Within the context of a biopsychosocial model the above literature posits that pain, pain anxiety, self-efficacy, and fatigue should be critical targets for psychosocial intervention and that targeting these areas may reduce disability and disease activity. Indeed there is evidence that psychosocial interventions are beneficial in RA by improving psychosocial functioning (Astin, Beckner, Soeken, Hockberg, & Berman, 2002). In their meta-analysis of psychosocial interventions employed as adjunctive treatments in RA, Astin et al. (2002) reported significant pooled effect sizes post-intervention for pain, psychological status, and self-efficacy. More recently in a clinical review of 'mind-body' psychosocial therapies (for example relaxation techniques, meditation, imagery, hypnotherapy, biofeedback, and cognitive behavioural therapy), Astin, Shapiro, Eisenberg, & Fors (2003) concluded that there was moderate evidence of efficacy, and consideration should be given to using them as "potentially effective adjunctive treatments for RA" (p.140).

However, there are inconsistencies within the literature regarding the effectiveness of psychosocial interventions. Newman, Steed, and Mulligan (2004) in their review of randomised trials involving psychosocial interventions, highlight that the outcome for many participants did not differ significantly when compared to controls. In another review, Savelkoul, de Witt, and Post (2003) concluded that not all studies employing psychosocial interventions report beneficial outcomes. Specifically, psycho-educational interventions had very little, if any, beneficial therapeutic effect (Riemsma, Taal, Kirwan, & Rasker, 2003), although one could

argue that the purpose of such an intervention was to provide the individual with facts rather than act as a therapy (Jones, 2002).

A further limitation of many psychosocial intervention studies is the absence of outcome measures of disease activity (Keefe et al., 2002). Pissetsky (2007) argues that to fully assess the impact of psychosocial interventions within a biopsychosocial framework, measures of disease activity should be employed in the methodology. The reciprocal relationship between the three systems of a biopsychosocial model implies that changes in the psychological or social systems would have an impact on the biological system. However, from the studies that do report some form of clinical assessment (commonly tender and swollen joint counts) there is little evidence that psychosocial interventions have a significant impact on the biology of the disease (Hammond & Freeman, 2001; Hill, 2001; Evers, Kraaimaat, van Riel, & de Jong, 2002).

It was the assumed relationship within a biopsychosocial model that stimulated the present study. Consequently, an objective of the present study was to examine the theoretically based assumption of the biopsychosocial model. Specifically, that a psychosocial intervention would directly affect the psychology system of the model and this would be reflected in beneficial changes in the biological system.

Studies in psychoneuroimmunology provide useful evidence for a possible mechanism through which a psychosocial intervention may impact on immune and neuroendocrine processes. The hypothalamic-pituitary-adrenocortical (HPA) and sympathetic adrenomedullary (SAM) axes have been identified as possible pathways (Lutgendorf & Costanzo, 2003) which are involved with both psychological and inflammatory processes (Straub, Dhabhar, Bijlsma, & Cutolo, 2005). Briefly, psychosocial processes such as increased perceived stress activate certain brain regions, including the paraventricular nucleus of the hypothalamus. This causes secretion of corticotrophin-releasing hormone (CRH), which leads to production of adrenocorticotrophic hormone (ACTH) via the pituitary gland. This increase in ACTH then

activates the adrenal medulla producing cortisol and norepinephrine, which have been shown to have an impact on both cellular and humoral immunity resulting in an inflammatory response (Tausk, Elenkov, & Moynihan, 2008). Specifically, during inflammation white blood cells secrete cytokines, such as interleukin-6 (IL-6). These cytokines then stimulate hepatic cells, macrophages, and lymphocytes to produce increased amounts of C-reactive protein (CRP) (Jabs et al., 2003). CRP is an acute phase reactant and a non-specific inflammatory marker which has been reported as the most useful biochemical marker of disease activity in RA patients (Yildirim et al., 2004). The erythrocyte sedimentation rate (ESR) is a more non-specific index of inflammation which has been used to assess disease activity in RA patients for many years (Felson et al., 1995).

Lutgendorf and Costanzo (2003) propose that psychosocial interventions alter the psychosocial processes, for example perceived stress, anxiety, and self-efficacy, or improve health behaviours, to provide a positive influence on neuroendocrine and immune factors. It has also been suggested that psychosocial interventions may reduce the perception of stress and emotional strain caused by a chronic disease such as RA (Pradhan et al., 2007) and facilitate homeostasis of the immune system (Lutgendorf et al., 2003). The result of this influence would be a decrease in disease activity.

In their meta-analysis Astin et al. (2002) concluded that while psychosocial interventions do not significantly influence the biological markers of disease activity in RA, they can influence some objective clinical indices of disease activity, namely tender joint count. However, in a novel study, Yoshino and Mukai (2003) investigated the effects of hearty laughter on the neuroendocrine and immune systems of RA patients and healthy controls. Clinical measures of immune function including NK cell activity, CD4 and CD8 ratios, and IL-6 revealed significant differences between the groups at baseline. After the intervention, only IL-6 levels remained significantly different. The results of this study provide suggestive evidence that

a psychosocial intervention can influence the immune system of individuals with RA. More recently, Bagheri-Nesami, Mohseni-Bandpei, and Shayesteh-Azar (2006) reported that a relaxation technique combined with meditation improved psychosocial outcomes significantly in people with RA when compared to controls. Additionally, there was a trend for improved clinical outcomes and decreased disease progression however the magnitude of this trend was not significant.

The literature indicates that psychosocial interventions may have a possible role in the modulation of immune function in RA. The psychosocial interventions employed in the present study were hypnotherapy and imagery. Hypnotherapy is defined as a state of focussed attention and concentration causing a temporary suspension of peripheral awareness (Spiegel & Moore, 1997). Hypnotherapy includes an induction to achieve this state before using imagery and suggestion for the purposes of therapeutic change. There is evidence to suggest that individuals who score higher in hypnotic susceptibility experience a greater degree of therapeutic change. For example in a study of HIV+ patients, participants who were highly hypnotisable experienced greater immunological response, specifically a significantly higher CD4+ t-lymphocyte count (Laidlaw et al., 2004) when compared to low hypnotic susceptibility participants. Additionally, cancer patients who score higher in hypnotic susceptibility report greater reductions in pain than cancer patients who score low in hypnotic susceptibility (Appel & Bleiberg, 2005).

In an early clinical trial of hypnotherapy with no control group, Domangue, Margolis, Lieberman, and Kaji (1985) demonstrated significant decreases in pain, anxiety, and depression post-intervention and increased plasma levels of β -endorphin. The authors concluded that hypnotherapy not only reduces self-report levels of pain, but also a biochemical correlate of pain intensity. Although this study indicates some evidence for hypnotherapy reducing the consequences of RA, including biochemical indices, there are several limitations. There was no

control group in the study and therefore it is possible that the changes observed were not the result of the intervention but the natural course of RA. Furthermore, the authors did not report disease activity. As the natural progression of the disease is characterised with unpredictable flares, participants may have been recovering from such flares. This would account for the changes observed in the outcomes measured.

Horton-hausknecht, Mitzdorf, and Melchart (2000) used a hypnotherapy intervention in 26 RA patients and reported significant improvements in acute phase reactants, ESR and CRP, as the biological markers of disease activity. However, the results of this study should be interpreted with caution. Some participants choose which arm of the study they wanted to participate in, and the intervention was conducted in small groups. The results of this study may therefore be contaminated by confounding variables such as expectancy and social support. Additionally, the RA patients in this study had low levels of ESR (27mm/hr) and CRP (5mg/l) indicating that their disease status was not active.

The other psychosocial intervention, imagery, which is an integral part of hypnotherapy, has been defined as the generation of images from at least one sensory modality for the purpose of evoking a psychophysiological state (Astin et al., 2003). Similarly to hypnotic susceptibility, there is evidence to suggest that imagery ability is related to greater therapeutic change. For example higher levels of imagery ability have been related to improved immune function in cancer patients using a psychosocial intervention involving an element of imagery (Ogston et al., 1997).

Limited research exists on the use of imagery in RA. A notable exception by Jacobi and Eisenberg (2001-2002) reported that an intervention using both imagery and music resulted in a significant decrease in pain in RA patients. However, the authors did not report any measures of disease activity. Studies using imagery combined with other modalities, including relaxation and cognitive behavioural therapy have demonstrated improved psychosocial functioning (Astin, et

al., 2002). Although in their meta-analyses Astin et al. (2002) report effect sizes for tender joints they do not include any direct measures of disease activity. A further limitation of these studies is that imagery was combined with other therapeutic modalities which made it impossible to assess the impact of imagery as a singular psychosocial intervention.

In chapter three of this thesis it was reported that hypnotherapy and imagery interventions in RA patients result in significantly improved health-related quality of life, and in chapter four, improved psychosocial functioning, specifically decreased pain, fatigue and functional disability. However, disease in these patients was controlled with pharmacological therapy and no disease outcome measures were reported.

Using patients with active disease, indicated by elevated ESR and CRP levels, would provide the opportunity to demonstrate whether psychosocial interventions such as hypnotherapy and imagery can influence clinical markers of disease activity and have an impact on the underlying biological disease process. To the best of the present authors' knowledge, no other published studies exist on the use of hypnotherapy or imagery, specifically in relation to disease activity in RA.

Recent improvements in the drug treatment of RA have been shown to reduce long term joint damage as well improve symptoms in the short term, therefore, it is no longer considered ethical to leave patients with active RA without drugs (Haslock, 1989; Stein & Pincus, 1999). Thus a double blind placebo controlled trial is no longer possible in active RA. Additionally, because of these improvements in drug treatment there are fewer patients with active disease who are not having their treatment regimen modified or starting on new drugs. These pharmaceutical interventions are aimed at reducing the activity of the disease and will of course impact on measures of disease activity. This means that it is very difficult to find a model of active RA to attempt to demonstrate whether a psychosocial intervention does influence the biological activity of RA. However there are some patients with active disease who are

“between drugs” and others who have suffered many side effects and request a few weeks off all drugs. This small group of patients was targeted for the present study.

In summary, the objectives of this experimental study were to examine the effect of imagery and hypnotherapy on psychosocial functioning and biological markers of disease activity in active RA patients. Given the results of the previous studies and the theoretical assumptions of the biopsychosocial model, it was hypothesised that these interventions will result in improved psychosocial function and a decrease in biological markers of disease activity in patients with active RA. Additionally, it was also hypothesised that those participants who score higher in hypnotic susceptibility or imagery ability will show a greater improvement in psychosocial functioning and disease activity than those who score lower in hypnotisability and imagery ability.

Method

Participants

Ten patients, 8 females and 2 males, were recruited directly from the North West Wales NHS Trust Rheumatology department. The average age of participants was 53.4 years. Inclusion criteria included a diagnosis of rheumatoid arthritis according to the American Rheumatism Association criteria (Arnett et al., 1987), active disease as indicated by an erythrocyte sedimentation rate (ESR) greater than 30mm/h, or a C-reactive protein (CRP) rate greater than 30mg/dl, and/or a disease activity score (DAS) greater than five. No new medications were to be taken for the duration of the study, which was no longer than two weeks. Patients with controlled disease were not considered for this study. There were no exclusion criterion for age or gender, however patients were excluded if there was a current history of substance abuse or serious mental health condition. Although participants were given no financial incentive to participate, traveling expenses were offered. The study was approved by the North West Wales NHS Ethics committee. Written consent was obtained from all participants.

Study Design

Due to the limited number of patients who were available to participate in this study, experimental case studies were the most appropriate methodology. Participants were randomised via a computerised on-line randomisation package to either a hypnotherapy or imagery intervention. All participants completed a set of outcome measures at baseline pre-intervention, and no longer than 2 weeks post-intervention.

Measurements

The independent variables were hypnotic susceptibility and imagery ability.

Hypnotic susceptibility. Hypnotic susceptibility was measured using the Stanford Hypnotic Susceptibility Scale, form C (SHSS:C; Weitzenhoffer & Hilgard, 1962). The SHSS:C was administered to each participant individually. There were 12 items which progressively increased in difficulty, and administration of this measure took one hour to complete. Three items measure participants response's to suggestions for changes in cognitive function and the remaining nine measure changes in perception and ideomotor functioning. Scores range from 0 to 12 where higher scores indicate greater susceptibility to hypnosis. Scores for zero to four are regarded as 'low hypnotisables', five to seven as 'medium hypnotisables', eight to ten as 'high hypnotisables', and 11 or 12 as 'very high hypnotisables' (Hilgard, 1965).

Imagery ability. Imagery ability was measured using the vividness of movement questionnaire (VMIQ; Isaac, Marks, & Russell, 1986). The VMIQ contains 24 items related to general movement imagery. Participants are asked to imagine these 24 items from two perspectives, watching someone else performing the task, and performing the task themselves. Each of the items on the VMIQ are scored from 1 (perfectly clear image) to 5 (no image at all). Overall scoring is summative, ranging from 2 to 240, with lower scores indicating greater imagery ability. The reliability of the VMIQ has been established using a test-retest method (Isaac et al., 1986).

The dependent variables measured in this study were clinical assessment of disease activity and psychosocial function, including, health related quality of life, pain, physical and mental fatigue, pain anxiety, self-efficacy, and functional disability.

Measure of disease activity. Measures of disease activity were obtained from a clinical examination by the same consultant or rheumatology specialist nurse at both baseline and post-intervention. These included: (a) the number of swollen and (b) tender joints using the 28 joints score (Smolen et al., 1995), (c) the patients global assessment of disease severity, using a 100mm VAS with the start and endpoint labelled '*no disease activity*' and '*worst imaginable disease activity*', (d) erythrocyte sedimentation rate (ESR), and (e) C-reactive protein (CRP). From the patient's global assessment of disease activity, swollen and tender joint score, and ESR, the disease activity score was calculated using the formula devised by Prevoo et al. (1995): $0.56\sqrt{(b)} + 0.28\sqrt{(a)} + 0.7\ln(d) + 0.014(c)$. A response criterion set by the European League Against Rheumatism (EULAR) considers changes of 1.2 on an initial score of 3.2 or less on the DAS28 as a good response to therapy. Moderate responders are those with an initial DAS28 of less than 5.1 and show an improvement between 0.6 and 1.2, or an initial score of 3.2 and improvement of greater than 1.2. Non-responders are patients with an improvement of less than 0.6, or those with an initial DAS28 greater than 5.1 and improvement between 0.6 and 1.2 (van Gestel, Haagsma, & van Riel, 1998). This response criterion was included in the present study. With regard to changes in ESR and CRP, the American College of Rheumatology have defined changes of 20% or more as clinical improvement (Felson et al., 1995). This criterion was also applied to changes in these acute phase reactants.

Health-related quality of life (HRQOL). HRQOL was measured using an individualised, and a generic HRQOL questionnaire. The individualised HRQOL was used to provide information relating to areas of the participants life which was important to them, and which would be used in tailoring either the imagery or hypnotherapy sessions. The Patient Generated

Index (PGI; Ruta et al., 1994) was employed as the individualised HRQOL measure. When completing the PGI, participants can identify up to five areas of their life that they perceive to be important (e.g., playing with grandchildren). In many studies a 'prompt' card is shown to participants to help them identify important areas. A score between 0 (*the worst you could imagine*) and 10 (*exactly as you would like it to be*) is allocated by participants to reflect how severely each of these areas is affected by their disease. Participants then are asked to give their own weighting to each of these areas. This is conducted by dividing a total of 12 points on each of the areas identified, the more points spent on a specific area indicates greater importance. The resultant index score is an overall reflection of the individual's perceived HRQOL. Higher scores indicate higher perceived HRQOL. The PGI has good reliability, validity and responsiveness (Martin, Camfield, Rodham, Kleimpt, & Ruta, 2007). Furthermore, in musculoskeletal disorders, when compared to eight other individualised HRQOL questionnaires, the PGI had the highest rating for validity, reliability, and responsiveness (Jolles, Buchbinder, & Beaton, 2005). The Short Form 36 Health Survey Questionnaire (SF-36; Ware & Sherbourne, 1992) was employed as a generic HRQOL measure. The SF-36 contains 36 items which are grouped into eight subscales, measuring physical functioning, role limitations due to physical health, bodily pain, general health, vitality, social functioning, role limitations due to emotional problems, and mental health. Scores on each subscale are expressed as values between 0 and 100 where a high score indicate good health. The SF-36 has been shown to have good psychometric properties in RA (McHorney, Ware, & Raczek, 1993).

Pain. A visual analogue scale (VAS) was used to measure perceived pain levels. The VAS was 100mm whose endpoints were labelled, '*no pain*' and '*pain as bad as it can be*'. Higher scores represent greater levels of perceived pain. The VAS is widely used in pain research and has found to have good validity and reliability (Huskisson, 1983). Changes of

20mm or more in RA patients are considered as clinically important (Wolfe, Hawley, & Wilson, 1996).

Fatigue. Physical and mental fatigue were both measured separately using a 100mm VAS with the endpoints were labelled 'no fatigue' or 'fatigue as bad as it can be'. Wolfe (2004) has shown the VAS to be a reliable measure for fatigue in RA. Decreases greater than 8.2mm are considered clinically significant improvement for patients with RA, whereas increases greater than 11.3mm are considered clinically significant deterioration (Khanna et al., 2008).

Pain anxiety. Pain anxiety was assessed using the short form pain anxiety symptoms scale (PASS-20; McCracken & Dhingra, 2002). The PASS-20 contains 4 subscales including cognitive anxiety, physiological anxiety, fearful appraisal of pain, and escape avoidance. Items in the PASS-20 are scored from 0 (never) to 5 (always). The PASS-20 has shown good reliability and validity with the longer 40 item version (McCracken et al., 2002).

Self-efficacy. Self-efficacy was measured using the Arthritis Self-Efficacy Scale (ASES; Lorig et al., 1989). The ASES contains three subscales relating to self-efficacy in relation to controlling pain, function, and an 'other symptoms scale'. Each of the scales starts with the phrase, "*How confident are you that you can...*". Participants rate their responses on a 10 point Likert scale. In total there are 28 items. Higher scores indicate greater self-efficacy for each specific subscale. The ASES has been shown to be valid for this group of participants (Barlow, Williams, & Wright, 1997). The pain and function scales were the only scales used in this study.

Functional disability. Functional disability was measured using the Health Assessment Questionnaire (HAQ; Fries, Spitz, Kraines, & Holman, 1980). The HAQ is a brief self-administered questionnaire designed specifically for use in RA patients. It contains 8 domains of function, each relating to activities of daily living. The results of each of the 8 subscales are reported on a 0-3 scale, where scores of 0 represent no functional disability and scores of 3 represent the worst functional disability. The HAQ has been used extensively in RA studies, and

has been shown to be effective and sensitive to deterioration in RA (Devlin et al., 1997), furthermore changes of .25 are considered clinically significant (Wolfe & Pincus, 1999).

Procedure

Patients who met the inclusion criteria were given an information sheet detailing the objectives of the study and what would be expected of them if they chose to participate. They were also given a brief description of hypnotherapy and imagery, and a consent form. All patients were given more than 24 hours before deciding whether they wished to participate in the study. After taking consent, blood samples were taken by a trained phlebotomist who was blind to the trial. Samples were taken for acute phase reactants, ESR and CRP, and a rheumatology consultant or specialist rheumatology nurse, who was unaware of randomization, performed the clinical assessment for the disease activity score. Participants were given a questionnaire pack (see Appendix A) and asked to complete it. The PGI in this questionnaire pack did not contain any 'prompt' list. This was to ensure that participants only mentioned those items which they felt were important.

Randomization to either the hypnotherapy or imagery group occurred when completed questionnaires were returned using an on-line software package (www.randomizer.org). Each participant was contacted to arrange a testing session for hypnotic susceptibility or imagery ability and to arrange the intervention sessions. Participants received six sessions of either hypnotherapy or imagery over a period of no longer than two weeks. The intervention period was decided through discussion with rheumatology consultants and the ethics committee at North West Wales NHS Trust.

Following, the six intervention sessions each participant had another two samples of blood taken at the same time of day as the previous samples. Participants met with the same consultant rheumatologist or specialist rheumatology nurse for a final clinical assessment. Finally, participants were asked to complete the same set of questionnaires as in the start of the

study. The original items that participants had identified as being important were written on post-intervention PGI, however participants were informed that they could amend these if they felt some items were no longer important or another item not previously mentioned was important. None of the participants changed any of the original items.

Intervention

The intervention sessions took place either at Bangor University or at the participants' own home. Each of the sessions lasted no more than one hour. The first sessions were standardized so that all participants in the hypnotherapy group received the same hypnotherapy session and those in the imagery group received the same imagery session. The content of the remaining five sessions was determined by what the participants identified as important in the PGI. Where any participant identified less than five areas the remaining intervention sessions focused on previous items identified in the PGI. Participants were also given a CD of their sessions to enable them to practice on a daily basis.

Data Analyses

Descriptive statistics of clinical assessment and disease activity are presented in tables 14 (hypnotherapy group) and 16 (imagery group). Tables 15 (hypnotherapy group) and 17 (imagery group) provide descriptive data from the psychosocial assessments. Two individual cases from each psychosocial intervention are presented as profiles under the headings of (a) demographic and social data, (b) disease history, (c) disease activity pre-intervention, (d) areas identified as important with scores pre-intervention, (e) intervention, (f) disease activity post-intervention, (g) and areas identified as important with scores post-intervention. The cases presented were matched as much as possible by sex, age, and disease duration. Following the presentation of case profiles, case summaries were produced for the five participants in each of the two intervention groups. These summaries were constructed to identify similarities and differences within this case-orientated approach (Stake, 1998). Stake (1998) argues that

conducting comparison of cases in this manner is “a powerful conceptual mechanism, fixing attention upon the few attributes being compared” (p. 97). A cross-case comparison is also provided exploring similarities and differences between the two interventions groups. In analysing the cases this way it will be possible to make limited generalisations about these two psychosocial interventions within a biopsychosocial framework in RA.

Results

Clinical outcomes of hypnotherapy group. Table 14 provides a summary of each participant’s scores of hypnotic susceptibility and results from the clinical assessment.

Participants in the hypnotherapy group scored between low to medium hypnotic susceptibility.

Of interest, two out of five participants in the hypnotherapy group achieved a moderate response as set out in the EULAR response criteria. The remaining three are classified as ‘non-responders’. Three participants reported a decrease of between one or two swollen joints, and two participants reported no change in the number of swollen joints. All five participants reported a decrease of between one to four tender joints. All five participants reported a decrease in global assessment of disease severity. Two participants achieved a decrease in ESR, with one of these being considered clinically important. The remaining three participants reported an increase in ESR. All participants achieved a decrease in CRP levels, with four of these being considered clinically important. Four of the five participants achieved a decrease in DAS28, with a mean decrease of 0.82. The remaining participant showed an increase of 0.1 for the DAS.

Psychosocial outcomes of hypnotherapy group. Table 15 reports the outcomes from psychosocial assessments for the hypnotherapy group. All five participants reported a decrease in pain, with two achieving a clinically significant reduction. Two participants reported a clinically significant decrease in physical fatigue. A further two participants reported an increase, however these were not considered clinically significant. The remaining participant reported no change in physical fatigue. Four participants reported a decrease in mental fatigue,

two being clinically significant, and one participant reported a slight increase. All five participants reported a decrease in pain anxiety. Self-efficacy for reducing pain increased in four participants, and slightly decreased in one participant. Self-efficacy for function increased in all five participants. All five participants reported a clinically significant decrease in functional disability. Health related quality of life, measured by the PGI, increased in three out of the five participants, and the remaining two participants reported no change. Where HRQOL was measured using the SF-36, all participants reported an increase in physical health, and four reported increased mental health while the remaining participant reported a decrease in mental health summary score.

Table 14. Hypnotic Susceptibility and Clinical Assessment

Participant		Hypnotic Susceptibility (0-12) ^a	Swollen joints (0-28)	Tender joints (0-28)	Global assessment (0-100)	ESR (mm/h)	CRP (mg/dl)	DAS28 (0-10)
JJ	pre	6	5	1	59	64	37	4.14
	post		5	0	19	75	27 ^b	3.91
MT	pre	6	8	6	74	84	75	6.30
	post		6	3	45	28 ^b	60 ^b	4.62 ^c
AW	pre	3	10	11	69	72	64	6.70
	post		9	9	52	75	60	6.22
JCT	pre	4	6	11	72	14	16	5.40
	post		6	9	70	21	10 ^b	5.48
CJ	pre	3	8	9	68	127	86	6.81
	post		7	5	48	110	50 ^b	5.96 ^c

^a higher scores represent greater susceptibility to hypnosis.

^b clinical improvement as defined by ARC criteria.

^c Moderate response to hypnotherapy intervention as defined by EULAR criteria.

Table 15. Psychosocial Outcomes: Hypnotherapy Group

Participant	Pain (0-100)	Physical Fatigue (0-100)	Mental Fatigue (0-100)	Pain Anxiety (0-100)	Self- efficacy Pain (0-50)	Self- Efficacy Function (0-90)	HAQ (0-3)	PGI (0-100)	SF-36 Physical (0-100)	SF-36 Mental (0-100)
JJ	pre 48	30	9	14	28	48	1.38	37	33	66
	post 33	14*	3	6	31	57	0.88*	50	41	54
MT	pre 94	71	100	71	22	28	2.75	23	27	28
	post 59*	77	81*	56	31	41	2.13*	54	35	43
AW	pre 36	70	45	41	24	40	1.38	37	25	49
	post 9*	23*	8*	32	22	47	1.13*	37	28	57
JCT	pre 70	59	23	50	26	38	2.75	38	25	59
	post 60	61	24	3	33	52	2.50*	47	31	61
CJ	pre 48	36	24	42	25	50	1.50	47	27	42
	post 29	36	20	35	42	57	1.25*	47	33	52

* Clinically significant difference from pre- to post-intervention

Case Profile 1: MT

Demographic and social data. MT is a divorced woman aged 47. Her marriage failed several years ago and she described it as being a 'not too pleasant break-up'. She is a full-time carer to her elderly mother who has been diagnosed with dementia for several years. She also cares for her two sons, one who is still at junior school, the other has left school and is unemployed. Both her sons have mild to moderate learning difficulties.

Disease history. Although MT was recently diagnosed with RA she claims that she can trace the start of the disease shortly after her marriage break-up and becoming less tolerable after her mother's diagnosis of dementia. She had been prescribed with 100mg daily of diclofenac, an anti-inflammatory drug rather than a DMARD.

Disease activity pre-intervention. Clinical assessment revealed that the present state of disease activity in MT at the start of the trial was very acute with elevated ESR and CRP levels and a DAS28 of 6.30.

Areas identified as important with scores pre-intervention. Important aspects of MT's life that had been affected by her RA were identified as; (1) not being able to walk her son to school because of her pain in her knees and legs rated extremely poor at 0/10, (2) not being able to cook because of pain in her hands rated at 3/10, (3) being unable to wash her hair independently because of pain in her hands rated at 3/10, and (4) generally being less mobile than ever before rated at 3/10.

Intervention. MT had 6 sessions of hypnotherapy over a period of two weeks. She scored 6 in the SHSS:C. As pain was a constant theme which she had identified in areas of her life that were important, MT had four sessions of hypnotherapy focussing on pain reduction. She also had a session on improving her immune function.

Disease activity post-intervention. Following the six hypnotherapy sessions, clinical assessment revealed a decrease in disease activity. She showed a clinically important

reduction in both ESR and CRP and a decreased DAS28 from 6.30 to 4.62. With the changes in the DAS28, MT showed a moderate response to the hypnotherapy intervention.

Areas identified as important with scores post-intervention. Following the intervention MT reported that ‘not being able to walk her son to school because of her pain in her knees and legs’ had improved from 0/10 to 6/10. She also reported that now she was walking her son to school most days. ‘Not being able to cook because of pain in her hands’ improved from 3/10 to 6/10, ‘being unable to wash her hair independently because of pain in her hands’ also improved from 3/10 to 5/10, ‘generally being less mobile than ever before’ improved slightly from 3/10 to 4/10.

Case Profile 2: JCT

Demographic and social data. JCT is 53 year old married woman who lives with her husband and four children in a small holding. Two of the children that live with her are fostered and have behavioural difficulties. She and her husband look after a number of animals including dogs, geese, several goats, and horses. She is a keen horse rider, and although she participated in competitions in the past she explained that it was more of a hobby for her now.

Disease history. JCT was diagnosed with RA ten years ago. She has had numerous DMARD’s, however these have failed to make any significant impact on her disease. At the time of the study she was taking 10mg of prednisolone, but complaining of increased aches and pains.

Disease activity pre-intervention. Although JCT did not have elevated ESR or CRP levels, clinical assessment revealed a number of high number of swollen and tender joints, and the patients global assessment of disease severity was also high. Therefore, clinical assessment suggested active disease indicated with a DAS28 of 5.40.

Areas identified as important with scores pre-intervention. JCT identified several important areas of her life that were affected by her RA. These included; (1) interrupted sleep which made her feel tired all day rated low at 3/10, (2) unable to ride her horses as often as she would like because of pain and tiredness rated at 4/10, (3) unable to play with her foster children because of pain and tiredness rated at 5/10, (4) unable to walk her dogs as often as she would like because of pain rated at 4/10, and (5) feeling tired and fatigued most of the time rated very low at 2/10.

Intervention. JCT received six sessions of hypnotherapy over a period of 8 days. She scored 4 in the SHSS:C. As fatigue and tiredness throughout the day were dominant themes raised by JCT the sessions focussed on fatigue and increasing energy levels, sleeping better through the night. She also received hypnotherapy session focussed on decreasing pain and improving immune function.

Disease activity post-intervention. Following the hypnotherapy sessions, clinical assessment revealed no change in swollen joints, a decrease in tender joints and improvement in the patients global assessment of disease severity. Her ESR increased slightly, but there was a clinically important reduction in CRP levels. Yet despite some improvement the overall DAS28 score increased from 5.40 to 5.48. In terms of response to this intervention, JCT is considered a non-responder.

Areas identified as important with scores post-intervention. Originally JCT rated 'interrupted sleep which made her feel tired all day' at 3/10, this improved to 5/10. 'Unable to ride her horses as often as she would like because of pain and tiredness' slightly from 4/10 to 5/10, 'unable to play with her foster children because of pain and tiredness' remained the same at 5/10, 'unable to walk her dogs as often as she would like because of pain' was rated worse, from 4/10 to 3/10, and 'feeling tired and fatigued most of the time' improved from 2/10 to 6/10.

Case Summation for Hypnotherapy Group

The hypnotherapy group consisted of four females and one male. Hypnotic susceptibility of this group was low with an average of 4.4 out of 12, ranging from three to six. The average age of participants in this group was 53.2 years, ranging from 47 to 63 years. Four the participants were married and one was divorced. None of the participants in this group were in full-time employment. With the exceptions of JJ, all of the participants were carers for their children, spouse, or parents. MT was the only recently diagnosed patient in this group, however she was able to trace the start of her symptoms to her marriage break-up several years ago, and increased severity of her disease with the rapid progression of her mother's illness. The remainder of this group had been diagnosed for between ten and 29 years. All participants in this group were able to identify an event in their life which they believed may have contributed to increase in disease activity. For example, JJ and her husband were in the process of trying to sell their house and AW's wife had a chronic condition which had deteriorated rapidly.

Clinical assessment pre-intervention revealed that all participants had a high level of disease activity indicated by the DAS28 scores, however in some cases levels of acute phase reactants were not particularly high. Following the intervention, clinical assessment revealed that four of the five participants in the hypnotherapy group achieved a decrease in disease activity, with several demonstrating clinically important reductions in CRP. Using the EULAR response criteria, two participants achieved a moderate response to the hypnotherapy intervention. The remaining three participants were classified as non-responders.

Of the areas identified by participants in the hypnotherapy group, pain was the most prominent factor. Fatigue and tiredness was also identified by most of the participants in this group. Other areas identified were; interrupted sleep, lack of motivation, stiffness, and general mobility problems.

Following the hypnotherapy intervention, psychosocial assessments revealed improved psychosocial function, specifically in relation to decreased pain, decreased mental fatigue, decreased pain anxiety, increased self-efficacy for function, decreased functional disability, and increased health-related quality of life measured by the SF-36.

Clinical outcomes of imagery group. Table 16 provides a summary of each participant's imagery ability score and results of the clinical assessment. Scores on imagery ability in this sample ranged between 102 and 164. In terms of low, medium, high imagery ability, all participants can be classified as medium imagery ability.

Importantly, four out of five participants achieved a moderate response to the imagery intervention, as defined by the EULAR response criteria. Two of the five participants in this group each reported a decrease of one in the number of swollen joints, and the remaining three reported no change. Three participants reported a decrease in the number of tender joints, and the remaining two reported no change. Four participants reported a decrease in global assessment of disease severity, the remaining participant reported an increase. All five participants in the imagery group showed a clinically important decrease in ESR levels. CRP was not recorded in one participant due to a laboratory error however, in the remaining four participants CRP levels also showed a clinically important decrease. All five participants achieved a decrease in DAS28.

Psychosocial outcomes of imagery group. Table 17 reports the outcomes from psychosocial assessments for the imagery group. All five participants reported a decrease in pain, with two of these being clinically significant. All participants reported a decrease in physical fatigue with three being clinically significant, and decreased mental fatigue with two being clinically significant. Four out of the five participants reported a decrease in pain anxiety, and the remaining participant reported a slight increase. Self-efficacy for reducing pain increased in four participants, and decreased in one participant. Self-efficacy for

function increased in four of the five, and remained unchanged in one participant. All five participants reported a clinically significant decrease in functional disability. Health related quality of life, as measured by the PGI, increased in all five participants. Where HRQOL was measured using the SF-36, all participants reported an increase in physical health, and four increased mental health. One participant reported no change in the mental health summary score.

Table 16. Imagery ability and clinical assessment

Participant		Imagery Ability (2-240) ^a	Swollen joints (0-28)	Tender joints (0-28)	Global assessment (0-100)	ESR (mm/h)	CRP (mg/dl)	DAS28 (0-10)
JB	pre	121	4	0	20	110	157	4.68
	post		4	0	30	70 ^b	26 ^b	3.58 ^c
DD	pre	164	1	2	43	59	67	4.53
	post		1	1	9	30 ^b	45 ^b	3.35 ^c
KT	pre	156	18	20	68	48	97	7.35
	post		17	20	42	32 ^b	63 ^b	6.67
SS	pre	102	3	15	85	42	-	6.46
	post		2	2	72	32 ^b	-	4.62 ^c
CD	pre	114	4	5	62	57	68	5.51
	post		4	3	48	42 ^b	54 ^b	4.82 ^c

^a lower scores represent greater imagery ability.

^b clinical improvement as defined by ARC criteria.

^c Moderate response to Imagery intervention as defined by EULAR criteria.

- CRP was not measured in this participant due to a lab error.

Table 17. Psychosocial outcomes: Imagery group

Participant	Pain (0-100)	Physical Fatigue (0-100)	Mental Fatigue (0-100)	Pain Anxiety (0-100)	Self- efficacy Pain (0-50)	Self- Efficacy Function (0-90)	HAQ (0-3)	PGI (0-100)	SF-36 Physical (0-100)	SF-36 Mental (0-100)
JB	pre 16	15	29	25	39	55	3.00	50	29	52
	post 3	0*	0*	10	50	83	1.75*	82	47	66
DD	pre 38	22	9	24	39	85	0.38	56	37	54
	post 4*	13*	6	12	47	88	0.13*	64	42	63
KT	pre 40	34	16	4	34	62	2.13	49	34	62
	post 36	33	14	6	27	63	1.88*	58	37	62
SS	pre 86	73	80	84	13	23	3.00	12	21	33
	post 70	70	56*	74	30	23	2.75*	28	24	34
CD	pre 65	48	30	36	31	48	2.38	38	28	51
	post 10*	29*	28	25	35	54	2.13*	51	35	52

* Clinically significant difference from pre- to post-intervention

Case Profile 3: JB

Demographics and social data. JB is a 55 year old divorced female who lives alone. She is a keen gardener and spends much of her time in her garden or greenhouse. JB has no immediate family as she and her husband decided not to have children. She has not worked for over three years, her last job being in a factory as a semi-skilled worker. JB says that she enjoys socialising with her friends and is a member of a local garden club.

Disease history. JB has been diagnosed with RA for three and a half years, and has not been in employment since her diagnosis. She was prescribed 7.5mg of prednisolone to control the disease activity. She attended the rheumatology urgency clinic after experiencing increased pain and swollen joints.

Disease activity pre-intervention. Clinical assessment revealed elevated levels of ESR and CRP, she also had several swollen joints, but no tender joints. Her disease status was active indicated by a DAS28 of 4.68.

Areas identified as important with scores pre-intervention. Within the PGI, JB identified (1) pain stopping her living her life to the full rated at 4/10, (2) being unable to do her gardening due to the pain and fatigue rated at 7/10 and (3) unable to socialise with friends as often as she would like due to the pain rated at 4/10.

Intervention. JB was given six sessions of imagery over a two week period. She scored 121 on the VMIQ. The sessions focussed on reducing pain and increasing energy levels as these were the main areas identified. JB also received an imagery session aimed at improving her immune function.

Disease activity post-intervention. Following the imagery sessions, clinical assessment revealed a clinically important decrease in ESR and CRP, however there was no change in swollen joints. Consequently disease activity was reduced indicated by a DAS28 of 3.58. The

decrease in the DAS28 score indicates that JB demonstrated a moderate response to the imagery intervention.

Areas identified as important with scores post-intervention. JB originally rated 'pain stopping her living her life' at 4/10, this improved to 8/10. 'Being unable to do her gardening due to the pain and fatigue' improved from 7/10 to 9/10 and 'unable to socialise with friends as often as she would like due to the pain' also improved from 4/10 to 8/10.

Case Profile 4: KT

Demographic and social data. KT is a 70 year old married woman, who lives with her husband. She is a retired school teacher and her husband is a retired engineer. Both are members of a local walking club and enjoy regular days away with their club on walks all over the country.

Disease history. KT has been diagnosed with RA for ten years. At the time of the study she was prescribed 3g sulphasalazine daily, 7.5mg prednisolone, and gold injections to help control her disease activity. She attended the urgency clinic complaining of increased pain and swelling in both her hands and knees.

Disease activity pre-intervention. Clinical assessment revealed a very active disease status in MT, indicated by elevated ESR and CRP levels, and a high number of swollen and tender joints. KT had a DAS28 of 7.35, the highest DAS28 in all participants.

Areas identified as important. KT identified the following areas as being important in her life but were affected by her RA: (1) pain preventing her from walking with her friends at their local walking club rated at 5/10, (2) problems driving to places where the walking club had set up a walk because of pain and fatigue rated at 6/10, and (3) unable to write as much as she wanted to because of pain and stiffness in her hands rated at 5/10.

Intervention. KT received six sessions of imagery over a two week period. She scored 156 on the VMIQ. Five of the imagery sessions focussed on pain reduction so that she would be able

to enjoy her walking more, and be able to write longer without pain in her hands. The final imagery session focussed on increasing energy levels and help to alleviate stiffness.

Disease activity post-intervention. Following the imagery sessions, clinical assessment revealed clinically important decreases in ESR and CRP, although she reported one less swollen joint, her tender joint count remained the same. Overall there was a decrease in the DAS28 to 6.67. Despite clinically important decreases in both acute phase reactants, the reduction in DAS28 was not sufficient and KT was a non-responder to the imagery intervention.

Areas identified as important with scores post-intervention. ‘Walking with her friends in their local walking club’ improved from 5/10 to 6/10, ‘driving to places where the walking club had set up a walk’ remained the same rated at 6/10, and ‘unable to write as much as she wanted to because of pain and stiffness in her hands’ improved from 5/10 to 6/10.

Case Summation for Imagery Group

The imagery group consisted of four women and one man. The average age of participants in the imagery group was 53.6 years, ranging from 29 to 70. Three participants in this group were married, one of the women was divorced and another woman was single. One of the women, KT, had never worked, and the three other women had retired due to ill health. DD, the only male in this group, was the only person in this study who still remained in full-time employment. The duration of diagnosis for the group was very widespread. KT had been diagnosed with RA from childhood, and although recently diagnosed, DD reported that he had lived with the symptoms of RA for more than four years. The other participants had been diagnosed between three and a half, and ten years. DD was able to identify an event which may have contributed to the increase in his disease activity, which he reported was positive event. The other participants were unable to identify any event which they perceived as possibly contributing to their disease activity.

Clinical assessment pre-intervention revealed that all participants in the imagery group had a high level of disease activity indicated by the DAS28 scores. Following the intervention, clinical assessment revealed that all five participants achieved a decrease in disease activity. Using the EULAR response criteria, four participants achieved a moderate response to the imagery intervention. The remaining participant was classified as a 'non-responder'.

The most prominent area identified by participants in the imagery group was pain. For example, JB reported that pain stopped her from socialising with her friends as much as she would like, DD reported that pain prevented him from walking as much as he would like and being a dairy farmer this had an impact on his business, KT identified pain from stopping her writing as much as she would like to, and SS reported that pain prevented her from spending time with her children. Other areas identified as important were; fatigue, general mobility, sleep, and anxiety.

Following the intervention intervention, psychosocial assessments revealed improved psychosocial function, specifically in relation to decreased pain, decreased physical and mental fatigue, decreased functional disability, and increased health-related quality of life measured by the SF-36 and the PGI.

Hypnotherapy and Imagery Cross-Case Comparisons

In summary, when comparing the number of participants reporting improvement in each of the dependant variables, the evidence from these ten case studies suggests that hypnotherapy was more effective than imagery at reducing the number of swollen joints, tender joints, pain anxiety, and increasing the patient's global assessment of disease severity, and self-efficacy for function. Imagery was more effective than hypnotherapy at decreasing ESR levels, reducing physical and mental fatigue, and increasing health related quality of life when measured by the PGI. Additionally, the imagery intervention produced a greater number of participants achieving a moderate response to the intervention, in accordance with the EULAR response criteria, than

the hypnotherapy group. Both interventions produced the same number of participants reporting clinically important decreases in CRP, decreased pain, self-efficacy for controlling pain, decreased functional disability and improved health related quality of life measured by the SF-36.

Discussion

The objective of this study was to examine the theoretical assumption of the biopsychosocial model of disease using active RA as the disease model, in that changes in the psychology system would result in changes in the biology system. More specifically, it was hypothesised that following a hypnotherapy or imagery intervention participants would report an increase in psychosocial functioning and due to the reciprocal relationship within the three systems in the model it was hypothesised that there would be a decrease in disease activity. The results from this series of case studies support the hypothesis that hypnotherapy and imagery improve psychosocial function and provide some evidence that these psychosocial interventions can positively influence disease activity in patients with active RA.

Disease activity was high in the participants of this study; nevertheless, it was reduced in the majority of participants. More importantly, six out of ten participants achieved a moderate response, as measured in DAS28, to the intervention. There are three possible explanations for the decreases in disease activity. First, it is important to consider the unpredictable nature of RA (Strahl et al., 2000). Participants in this study were in the process of having a flare in their arthritis. It may be possible that during the intervention period the flare ran its natural course, therefore the change in disease activity was not entirely due to the interventions. Second, the DAS28 is a composite measure of objective and subjective scores. The number of swollen joints and ESR are the objective measures in the DAS28. In the sample only half participants had a decrease in the number of swollen joints, and of those, the number of decreased swollen joints was low, between 1 and 2 per participant. Seven out of the ten participants had lower levels of ESR following the intervention, indeed six of these were regarded as clinically important

reductions. However, if these decreases are not explained by the natural remission of the flare, it may be possible that the subjective scores, namely the number of tender joints and the patient's global assessment of disease inflated the reduction in disease activity.

The final possible reason could be due to the reciprocal relationship between the psychology system and the biology system in the biopsychosocial model of disease. From a psychoneuroimmunological perspective, these two interventions may have buffered negative psychosocial experiences of these participants with active RA. This would have led to a decrease in the secretion of CRH, causing a reduction in ACTH and reduced immune activity, resulting in a decreased inflammatory response. Psychosocial function did improve in this group of participants, as did acute phase reactants, ESR and CRP, the biological markers of disease activity.

The design of this study did not permit for identification of a causal relationship between the three systems of the biopsychosocial model. In order to examine the relationship between the three systems of the model to identify causality, further research would have to adopt a prospective longitudinal design in a larger sample of RA patients. Such a study would undoubtedly be expensive, not only in funding, but also in the time required by participants completing psychosocial measures and having samples taken for laboratory analyses to assess levels of disease activity. Furthermore, the design of such a study would pose a dilemma in relation to ethical consideration.

As a measure of disease activity in RA, the DAS28 has shown to be a valid and reliable measure (Prevoo et al., 1995). It is the most commonly used measures of disease activity in clinical practice and clinical trials. However, there are some criticisms of this measure. The DAS28 does not take into account the number of tender or swollen joints in the feet or ankles (Kameda et al. 2006). This is an important consideration particularly as some of the participants in the present study identified mobility as a problem, which may have been caused by swelling

and tenderness in the feet and ankles. Furthermore, Gardiner et al. (2005) reports that the DAS28 score has been shown to change significantly even when there is little evidence of clinical improvement. This is due to the formula used to calculate the DAS28. Acute phase reactant ESR values are log transformed so that changes in high baseline values of ESR have less contribution to the overall score than lower baseline ESR values of the same absolute change. In relation to the present study, the hypnotherapy group had a higher average ESR levels at baseline than the imagery group. Therefore, in order to achieve comparable changes in the DAS28 score participants in the hypnotherapy group were required to have greater absolute ESR changes post-intervention.

In response to the criticisms of ESR, Yildirim et al. (2004) report that the acute phase reactant, serum CRP, is a more useful biochemical marker of disease activity in RA patients. Using serum CRP levels as an indicator of disease activity in participants of the present study, eight out of the ten achieved clinically important decreases in CRP. This provides further evidence for the biological effects of imagery and hypnotherapy in active RA.

An investigation of psychosocial outcomes reveals that both hypnotherapy and imagery improved psychosocial function in patients with active RA. These results are consistent with results from other previous chapters in this thesis using patients with stable RA. Astin et al. (2002) reported that imagery combined with relaxation or cognitive behavioural therapy resulted in moderate effect sizes for pain, fatigue and self-efficacy. Specifically, chapter three of this thesis reports improved health related quality of life when measured with the PGI, and chapter four identifies that both imagery and hypnotherapy resulted in clinically significant reductions in pain, fatigue and functional disability in patients with stable RA.

Pain and fatigue are the most common problems reported by patients with RA (Schoenfield-Smith et al., 1996; Pollard et al., 2006), and contribute to increased levels of functional disability (Walker et al., 2005). Pain and fatigue were reduced in these participants

post-intervention. Furthermore there were clinically significant reductions in functional disability in all participants. However, due to the sample size it is not possible to determine whether the psychosocial interventions employed in this study had a direct influence on disability or whether these clinically significant reductions were due to the decreases in pain and fatigue as suggested by Walker *et al.* (2005).

Self-efficacy is an important construct which has been reported to influence pain and fatigue in RA (Younger et al., 2008). However, given that self-efficacy has been related to pain and fatigue it was unexpected that those participants who reported the highest increases in self-efficacy were not those who reported the highest decreases in pain and fatigue. This is in contrast to the findings of Younger et al. (2008). A possible explanation for this inconsistency could be the wide range of self-efficacy scores at baseline. The participant with the highest increase in self-efficacy had a low baseline score. Furthermore, the post-intervention score for this participant was lower than other participants' baseline score of self-efficacy. Therefore, although the increase was higher in absolute terms, the actual score was still lower than other participants.

Pain anxiety was reduced in all participants in the hypnotherapy group and all but one participant, from the imagery group. As pain anxiety has been linked with functional disability (Strahl et al., 2000), it was expected that functional disability would be decreased in all those participants who reported a decrease in pain anxiety. Our results confirmed this hypothesis.

Studies employing hypnotherapy report that participants who score higher on measures of hypnotic susceptibility achieve better outcomes than those who score lower (Appel et al., 2005; Laidlaw et al., 2004). The hypothesis that higher hypnotic susceptibility would have greater improvement was not supported by the results of this study. Although participants who scored medium hypnotisability showed greatest improvements in pain reduction and self-efficacy for functioning, those who scored the lowest on the SHSS:C showed the greatest improvements in physical fatigue and pain anxiety. Changes in mental fatigue and self-efficacy for controlling pain

were similar for both medium and low hypnotic susceptibility. With respect to clinical assessment and hypnotic susceptibility, there are also some conflicting results. For example, of the two participants who scored the highest on the SHSS:C, one had the greatest decrease in the number of swollen joints, ESR and DAS28 score, whereas the other had no change in the number of swollen joints, an increase in ESR and the lowest DAS28 score change. This is not consistent with previous research and indicates that hypnotic susceptibility in our sample was not a factor which influenced overall psychosocial or clinically beneficial outcome. However, given the sample size in the present study these interpretations should be treated with caution.

A similar trend was also observed in the imagery group. The hypothesis that participants with greater imagery ability would achieve better outcomes is not supported by the results of this study. With respect to psychosocial assessment, the participants with the greatest decreases in pain, physical fatigue, mental fatigue, pain anxiety, and self-efficacy for function did not have the highest imagery ability score. In the clinical assessments, the participant with the greatest imagery ability had the largest decrease in the number of tender joints and greatest decrease in overall DAS28 score. However, it was reported that they also had the lowest change in ESR, and the same change in number of swollen joints as the participant with the lowest imagery ability. Indeed, the person with the lowest imagery ability had the second greatest change in overall DAS28 score. It is apparent that, for the participants in this study, imagery ability did not influence outcome. However, as no other published studies exist examining the relationship between imagery ability and therapeutic change in RA patients, further research is warranted in this area.

Two possible explanations for the differences between the expected and actual results in hypnotisability and imagery ability may be due to social factors within a biopsychosocial model and stress in the daily lives of the participants in this study which were not taken into consideration. Although socio-economic status was not an independent variable in this study it

was apparent that both intervention groups contained a heterogeneous sample of participants. For example some participants lived in council properties and received state benefits, whereas others lived in private accommodation with added income from private pensions. Jacobi et al. (2003) has shown that in patients with a low socio-economic status the impact of RA is more severe. Within a biopsychosocial model it would be reasonable to assume that the beneficial impact of these psychosocial interventions may have been reduced by the negative impact from the social system, for example poorer socioeconomic status. Gender has also been identified as a variable which influences disability in RA. Harrison and Symmons (2000) noted that disability scores tend to be higher in women than in men. Indeed this was evident in the present sample of participants. Both men who participated in this study reported less functional disability than the women, even when biological markers of disease activity were higher in these men than most of the women. A possible explanation for this comes from a cultural-phenomena perspective, which suggests that men do not necessarily have less functional disabilities than women, but that men with RA actually over-estimate their functional abilities (van den Ende, Hazes, Le Cessie, Breedveld, & Dijkmans, 1995).

Of specific interest is the role of care-giver with the majority of participants in this study. Such individuals are at an increased risk of higher disease activity due to the additional perceived stress from care-giver strain (van Zanten, Ring, Carroll, & Kitas, 2005). Specifically, caregiver strain has shown to be associated with increased levels of the acute phase reactant CRP (Wright et al., 2004). In the present study the smallest changes in CRP were found in participants who were full-time carers for either chronically ill spouse, children with behavioural difficulties, or chronically ill parent. Within a biopsychosocial framework it is possible to hypothesise that the beneficial effects of hypnotherapy and imagery in these participants may have been buffered and reduced by the negative influence of their care-giver role.

A possible mechanism through which hypnotherapy and imagery make beneficial changes to psychosocial function and disease activity might be through the use of more active coping strategies employed by these participants. Treharne, Lyons, Booth and Kitas (2007) have investigated the effects of different coping strategies employed by RA patients and report that patients under greater perceived stress who do not use active coping strategies are at risk of psychological comorbidity. Dekkers et al. (2001) also identified that problem focussed coping buffers the effects of stress. It is already known that stress can have a negative impact on the immune system of individuals (Lutgendorf et al., 2003), and more specifically on disease activity of RA patients (Zautra, Smith, & Yocum, 2002). Given the situations that the majority of the participants in this study were under it is probable that they had increased perceived stress from either their role as care-giver or from the unpredictable nature of RA. Therefore it may be the use of imagery or hypnotherapy facilitated a change in coping style which could buffer the effects of stress and have a positive impact on disease activity.

There are a number of limitations with the present study. The sample size is low, however as indicated earlier it is not possible to conduct a randomised controlled trial in active RA patients due to the ethical considerations. Related to this was the short time allowed for the intervention. It may be that with prolonged use of these interventions the results would be more encouraging. In the study of stable RA patients reported in chapter four there was no correlation between amount of time practising imagery or hypnotherapy, and beneficial psychosocial outcomes. However, it should be noted that participants in that study had six weeks of the intervention whereas participants in the present study had a maximum of two weeks. Additionally, there are a number of variables within the biopsychosocial framework which were not considered in this study, particularly the role of care-giver, perceived stress, and coping style. Future research could focus on the use of hypnotherapy and imagery as adjunct psychosocial interventions with active RA patients taking prescribed medication and take into account the role of care-giver, perceived

stress and different types of coping styles. This would help to establish any beneficial clinical outcomes over and above that of medication alone, and identify whether these psychosocial interventions influence perceived stress, and facilitate a change in coping style. Since such a study would inevitably involve a larger sample size, it would be possible to examine the effects of hypnotisability and imagery ability more thoroughly.

In conclusion, the results of these case studies indicate that hypnotherapy and imagery have a beneficial impact on psychosocial functioning and provide some evidence for these two interventions impacting disease activity in active RA patients. Furthermore, the results support future research on a larger scale using these interventions with active RA patients taking medication. Combined with the results of previous studies exploring the therapeutic effects of hypnotherapy and imagery in stable RA patients, we concur with the conclusions of Astin et al. (2003) that psychosocial interventions, specifically hypnotherapy and imagery should be considered as adjunct therapies in the clinical care of patients with RA.

CHAPTER SIX

GENERAL DISCUSSION

Summary

The objective of this research programme was to explore the use of imagery and hypnotherapy as psychosocial interventions using a patient-centred approach in patients with rheumatoid arthritis (RA). Patient-centredness was enhanced throughout the research programme by allowing participants to identify their own specific areas for therapeutic change through the use of the Patient Generated Index (PGI; Ruta, Garratt, Leng, Russell, & MacDonald, 1994), a patient generated outcome measure (PGOM). Additionally, measurement of dependent variables utilised patient reported outcome measures (PROMs).

The first chapter of this thesis provided an overview of rheumatoid arthritis and a biopsychosocial perspective of the disease, indicating some of the symptoms which may be targeted for psychosocial intervention. Chapter two included a review of the literature of psychosocial interventions in RA and providing a platform for the use of imagery and hypnotherapy as psychosocial interventions in the present research programme. Specifically, within this review and in the literature it is identified that there was a need to utilise imagery as a stand-alone intervention. Furthermore, given the usefulness of hypnotherapy in other chronic disease yet a lack of this intervention being investigated in RA patients, these two psychosocial interventions were utilised in the research programme.

A patient-centred approach specific to health related quality of life (HRQOL) was examined in chapter three of this thesis. Specifically, the measurement of HRQOL has become an important outcome in chronic diseases where there is no cure, and measuring HRQOL should help to direct how the disease is managed (Fayers & Machin, 2000). In chapter three a PGOM, the PGI (Ruta, Garratt, Leng, Russell, & MacDonald, 1994) was compared to a PROM, the Short Form 36 Health Survey Questionnaire (SF-36; Ware & Sherbourne, 1992). Forty two participants with stable RA completed the PGI, identifying important areas of their life which were affected by their disease. The results indicated that the SF-36 did not capture all of the areas that individuals identified. The evidence of a discrepancy between these two measures has clinical and research implications which are discussed later in this chapter.

Furthermore, it was also identified that following psychosocial intervention using imagery or hypnotherapy, the SF-36 was less sensitive to detect changes in HRQOL than the PGI, which showed increases in HRQOL. The SF-36 is the most widely used HRQOL measure in RA trials and clinical practice (Kalyoncu, Dougados, Daures, & Gossec, 2008), however the results presented in chapter three demonstrate that HRQOL, as measured by the SF-36, following a psychosocial intervention did not change. The clinical implications of this are discussed further in this chapter.

Using the same group of stable RA patients, the forth chapter of this thesis examined the efficacy of imagery and hypnotherapy with a particular focus on the symptoms associated with this disease (e.g. pain, fatigue, pain anxiety, self-efficacy, and functional disability). Using a randomised controlled trial design it was identified that both these psychosocial interventions significantly improved some areas of psychosocial

functioning, and in many cases this improvement was clinically significant. Specifically, both imagery and hypnotherapy significantly reduced pain at post-intervention. Only hypnotherapy demonstrated significant long-term beneficial effects, specifically in increased self-efficacy for controlling pain and decreased functional disability. However, both interventions achieved clinically significant results in physical and mental fatigue, and functional disability, which were maintained at six months follow-up.

Given that imagery and hypnotherapy have a clinically significant impact on some of the symptoms associated with RA, chapter five explored the effect of these psychosocial interventions on disease activity in active RA patients, where these patients often experience more severe symptoms than stable RA patients. Specifically in a biopsychosocial model of disease, the assumption that changes in one system (in this case the psychology system) can lead to changes in the other systems (the biology system), was tested using ten patients in a case study approach.

The results presented in chapter five identified several areas of improvement in clinical assessment, indicating a reduction in disease activity with two participants in the hypnotherapy group and four participants in the imagery group achieving a moderate response to the intervention in accordance with EULAR response criteria. Additionally, all participants reported some improvement in psychosocial function, for example all ten participants reported decreased pain and functional disability, four participants in the hypnotherapy group and all five in the imagery group reported decreased mental fatigue, and all five participants in the hypnotherapy group and four participants in the imagery group reported decreased pain anxiety. Furthermore, clinically significant reductions in pain were achieved in two participants in the hypnotherapy group and two from the

imagery group. Two participants in the hypnotherapy group and three from the imagery group also achieved clinically significant reductions in physical fatigue and clinically significant reductions in functional disability was achieved in all ten participants.

The implications to research and clinical practice have been discussed in the relevant chapters of this thesis. The objective of this final chapter is to synthesise the research and clinical implications from the preceding chapters in an attempt to provide meaningful conclusions from this research programme. Specifically, several areas are discussed including imagery and hypnotherapy as psychosocial interventions, methodological issues, the strengths and weaknesses of the research programme are identified, future research and applied clinical directions are suggested. Finally, this thesis is concluded using the mnemonic *FINER* suggested by Hartrick (2008) for aiding systematic reflection of the research process.

Imagery and Hypnotherapy as Psychosocial Interventions

Imagery and hypnotherapy were the psychosocial interventions employed in the present research programme. Within a large body of the wider research literature the terms hypnosis, hypnotherapy, guided imagery, and imagery are used interchangeably and applied to both imagery and hypnotherapy (cf. Zelter et al., 2002). However, in this research programme the concepts were defined and operationalised separately. The present research programme further identified differential effects of these two psychosocial interventions. While these psychosocial interventions are similar therapeutic tools (Luskin et al., 2000) and imagery is an integral part of hypnotherapy (Spiegel, Greenleaf, & Spiegel, 2000), there is an induction procedure involved in hypnotherapy and not imagery. This induction procedure has been likened to a state of deep relaxation

(Gay, Philippot, & Luminet, 2002). Participants in the imagery group were given no instructions to relax therefore the difference between these two interventions may be due to relaxation. As there was no relaxation control group in this research programme this is identified as a weakness and discussed later in this chapter.

Within the results of this thesis it was demonstrated that both these psychosocial interventions significantly improved many of the symptoms associated with RA and achieved significantly increased HRQOL. Furthermore, in chapter five it is reported that imagery and hypnotherapy significantly improved psychosocial functioning in RA and in some cases had clinically meaningful impact on the biology of the disease. However, there were some differences in the results between imagery and hypnotherapy. In chapter three it was reported that at post-intervention both imagery and hypnotherapy significantly improved HRQOL when measured by the PGI, with only the hypnotherapy group maintaining this increase at six months follow-up. In chapter four it was also reported that hypnotherapy was more effective than imagery in relation to decreasing physical fatigue, increasing self-efficacy for controlling pain, and decreasing functional disability. Given the results presented in these two chapters it was concluded that hypnotherapy was overall more effective than imagery for patients with stable RA.

Although the explanation that the induction procedure in hypnotherapy makes this psychosocial intervention more effective than imagery, the results presented in chapter five are not consistent with this. Specifically, both imagery and hypnotherapy were equally effective at improving psychosocial functioning in active RA patients. Importantly, in terms of changes in disease activity, more participants in the imagery group achieved a moderate response, defined by EULAR, to the intervention than those

who had hypnotherapy. Furthermore, all five participants in the imagery group achieved clinical improvement in ESR values, as defined by ARC criteria, and only one in the hypnotherapy group achieved this. Therefore, it could be argued that imagery was more effective than hypnotherapy in patients with active RA.

It is difficult to compare the results from the studies in this thesis to draw meaningful conclusions about the effectiveness of imagery and hypnotherapy for three reasons. First, there was a difference in the disease status of participants who participated in this research programme. Specifically, chapters three and four involve patients with stable RA (i.e. their current anti-rheumatic medication is controlling the biology of their disease), whereas participants in the study reported in chapter five had active disease (i.e. their anti-rheumatic medication was not controlling the biology of their disease). Indeed, no published evidence exists comparing the efficacy of these psychosocial interventions in active and stable RA patients. However, Kessler (2001) suggests that psychosocial intervention at the early stages of disease may be more effective and have lasting effects than later intervention.

Indeed, Sharpe et al. (2001) raise the question that similarly to early pharmacological intervention, psychosocial interventions in early RA may be more beneficial. Using cognitive behavioural therapy as a psychosocial intervention they reported significant reductions in depression and improvement in joint function when compared to a 'care-as-usual' control group (Sharpe, Sensky, Timerlake, Ryan, & Allard, 2003). Although the results of their study suggest that CBT was an effective adjunct therapy in early RA with the outcomes remaining significant at 18 months follow-up, the

question as to whether early psychosocial intervention is better remains unanswered, as they did not compare with long-standing RA patients.

If, similarly to early pharmacological intervention, early psychosocial intervention has longer term better outcome, then this might explain the non-significant results at follow-up reported in this research thesis. Participants who took part in this research programme had long disease duration, specifically in the study reported in chapter three and four, the mean disease duration was more than 13 years. This is discussed further later in this chapter.

The second notable difference between the studies presented in this thesis was that hypnotic susceptibility and imagery ability were not measured in the study reported in chapters three and four. Therefore, it is possible that participants in the imagery group had lower imagery ability and participants in the hypnotherapy group had high hypnotic susceptibility. This might explain the differences between the effectiveness of these two interventions. However, the results in chapter five indicate that hypnotic susceptibility and imagery ability were not related to better overall improvement. Participants with greater hypnotic susceptibility or imagery ability did not report the greatest improvement, nor did participants with the lowest hypnotic susceptibility or imagery ability report the least improvement.

Finally, the methodologies were different. Chapters three and four used a randomised controlled trial design, whereas the study reported in chapter five used a case study approach. An objective of the study reported in chapter five was to investigate the biopsychosocial model of active disease following a psychosocial intervention. Although randomised controlled trials are regarded as the gold standard (Barton, 2000), this was

not possible. To investigate the effects of imagery and hypnotherapy in active RA would require withholding anti-rheumatic drugs, as these would affect the biology of the disease. This is not considered ethical (Haslock, 1989; Stein & Pincus, 1999). Therefore a case study approach was utilised. Consequently, the analyses performed on the data in chapters three and four included inferential statistical analyses and clinical significance whereas no inferential statistical analyses were performed in chapter five.

Methodological Issues

Statistical versus clinical significance. Within this thesis both statistical and clinical significant changes in dependent variables were reported. Specifically, the reporting of statistically and clinically significant change reported in chapter four raises some important issues for researchers and clinicians. Traditionally, treatment effects have been examined using statistical significance where the mean changes between groups are compared. Statistical significance informs us that the associations between the tested variables (e.g. changes in a dependent variable between two intervention groups) did not occur by chance. More specifically, with an alpha level of 0.05 we can reject the null hypothesis in the knowledge that probability of the association occurring by chance was less than 5% (Kramer, 1988). However, this approach to examining the clinical efficacy of interventions has been criticised as it neglects the impact of a treatment, which is considered more important from a clinical perspective (Jacobson & Traux, 1991).

Throughout the literature clinical significance is further confused as the definition of this construct varies from different perspectives, for example the patient, the clinician, and policy makers (Greenstein, 2003). Indeed, there is a lack of consensus in the definition of 'clinically significant' (cf. Sloan, Cella, & Hays, 2005). However despite

this lack of consensus, clinical significance is generally regarded as “the noticeable difference an intervention makes in the everyday life of patients or to others with whom the patients interact” (Kazdin, 1999, p. 332). Where statistical significance and clinical significance differ the greatest is in their perspective of change. With regard to treatment efficacy, statistical significance focuses on the numerical differences between and within groups (Greenstein, 2003), whereas clinical significance focuses on the impact to the patient of this numerical change (Kadzin, 1999). For example, in the current thesis it was reported that there were no statistically significant difference in pain post-intervention between the imagery and hypnotherapy group, however these were statistically significantly lower than the control group. From a statistical perspective this result seems promising, and may indicate that both imagery and hypnotherapy are beneficial for relieving pain in RA patients in the short term. However, neither group achieved a clinically significant result, meaning that the decreases in pain observed in these two intervention groups did not have a significant impact in these patients. Similarly, it was reported in chapter four that the hypnotherapy group had significantly less physical fatigue than both the imagery and control group, however both intervention groups achieved a clinically significant change in physical fatigue. Notably though, the clinical effect size was greater for the hypnotherapy group.

Crosby, Koltkin, and Williams (2003) have stated that statistical significance is not the same as clinical significance. For example, in studies with large sample sizes significant differences may be found with small numerical differences, however this does not necessarily mean there is a clinically significant difference between or within groups. Similarly, in studies with small sample sizes there may be no statistically significant

differences between or within groups with large numerical differences which may be clinically significant. Indeed, this is apparent in the results reported in chapter four of this thesis. Clearly, in clinical research and specifically in clinical practice, both statistical and clinical significance should be considered as equal and not in opposition.

Strengths of the Research Programme

Patient-centred approach within the research programme. A particular strength of the present research programme was the patient-centred approach used throughout. A patient-centred approach encompasses a biopsychosocial perspective of disease, where the individual is central to treatment, rather than the disease (Del Piccolo, Mazzi, Scardoni, Gobbi, & Zimmermann, 2008). This patient-centred approach was achieved by three specific techniques. First, the use of PROMs, second, the use of a PGOMs, and finally, tailoring the psychosocial intervention to the items identified as important by participants in the PGOM.

The use of patient reported outcome measures in research and clinical practice is not a novel technique (Fairclough, 2004). Indeed such measures have been used for decades allowing patients to report, for example levels of pain, depression and anxiety (Bowling, 1995). The use of PROMs in research and clinical practice encourages patient and physician communication, and a greater understanding of the patient's perspective of illness and disease (Higginson & Carr, 2001). However, as demonstrated in chapter three of this thesis, the use of fixed-item HRQOL PROMs, specifically the SF-36, may not facilitate greater patient-centredness as it does not fully capture what is important from a patient's perspective.

The use of the PGI as a PGOM enhanced the patient-centred approach throughout this research programme. The main difference between PROMs and PGOMs is that PGOMs allow patients to identify areas which they consider important, rather than completing items on a pre-defined domain, traditionally selected by researchers and clinicians, in PROMs (Patel, Veenstra, & Patrick, 2003). Perhaps the greatest strength of this research programme which distinguishes it from the current literature was the use of a PGOM to identify areas for psychosocial intervention. To the best of the present author's knowledge this is the first intervention study to use this approach in RA. This approach exemplifies a patient-centred approach in that the patient takes shared responsibility for the identification of areas for therapeutic change and the goals of treatment.

Imagery as a stand-alone therapeutic modality. Throughout the RA literature, when imagery has been employed as a psychosocial intervention it has never been used independently from other therapeutic modalities. Indeed, in chapter two of this thesis, the review identified seven studies which combined imagery with another modality. As a consequence the efficacy of imagery in RA is unknown. Indeed, several authors have recognised this limitation and recommended the use of imagery as a stand alone therapy in future studies (Astin, Beckner, Soeken, Hochberg, & Berman, 2002; Luskin, Newell, Griffith et al., 2000; Morone & Greco, 2007). The present research programme addressed this limitation and used imagery as a psychosocial intervention without combining it with any other psychosocial modality.

Focus on dependant variables important to RA patients. Throughout this research programme the dependant variables measured were selected because of their relevance to

RA patients. This was achieved in two ways. First, through the use of the PGI participants are able to identify specific items and areas of their life. The use of the PGI has been discussed in detail in this chapter and within this research thesis. Second, dependant variables in this research programme were taken from the OMERACT (Outcome Measures in Rheumatology Clinical Trials) core set of outcome measures (e.g. pain, fatigue, functional disability). Specifically, at the OMERACT 6 meeting in 2002, provision was made for patient participation (Kirwan et al., 2005). The result of involving patients in the OMERACT group means that outcomes measured in clinical studies will be of more relevance to RA patients, and increase the generalisability of the results of such studies.

Interdisciplinary research team. Although this thesis is the work of the present author, it is acknowledged that a particular strength of the research programme was the interdisciplinary approach in the research team. Specifically, the research programme was supervised by Dr Nichola Callow with expertise in psychology and research, and Dr Jeremy Jones, an expert in the clinical area of rheumatology. The interdisciplinary approach to this research programme meant that both clinical and academic areas were synthesised to produce designs of studies which met the demands of academia whilst incorporating the needs of 'real life' clinical aspects of rheumatology. Furthermore, it is the opinion of the present author that this approach increased the applied value of the research programme and this completed thesis.

Post-experimental questionnaire. Including a post-experimental questionnaire in the design of the research programme made it possible to examine variables other than the intervention which may have had an influence on the outcome, for example hope,

expectation, and reaction to randomisation. In chapter four it was identified that the participant's reaction to randomisation was significantly related to decreases in physical fatigue and functional disability. As a result of utilising the post-experimental questionnaire in the present research programme we now know that the results should be interpreted with some caution. Throughout the health research literature very few intervention studies report the use of post-experimental questionnaires. Given the findings reported, specifically that reaction to randomisation may influence outcome, this raises questions regarding the results of other randomised studies which have not incorporated such a measure in their design.

Measurement of imagery ability and hypnotic susceptibility. A potential weakness of many studies, involving imagery and hypnotherapy as psychosocial interventions, is the omission of imagery ability and hypnotic susceptibility. Specifically, in the review of psychosocial interventions presented in chapter two of this thesis, none of the studies which utilised imagery as part of their therapeutic modality measured imagery ability. In relation to hypnotic susceptibility, the two studies identified in the review did not measure hypnotic susceptibility. Research from other domains, for example sports psychology have identified that imagery ability has an impact on outcome (cf. Gregg, Hall, & Butler, 2007). There is also evidence from the health literature that hypnotic susceptibility can influence outcome (cf. Appel & Bleiberg, 2005; Laidlaw et al., 2004). Although imagery ability and hypnotic susceptibility were not measured in chapter three and four, and this was discussed as a potential weakness of this study, they were measured in the study reported in chapter five of this thesis.

Ethical considerations. Particularly, for the study reported in chapter five of this thesis careful attention was given to the ethical considerations of such a study involving patients with active RA not taking any pharmacological intervention. After consulting with rheumatology specialists a case study design was considered the best research methodology, with active RA patients who were in-between anti-rheumatic drugs chosen as the target population. Furthermore, it was agreed that the psychosocial intervention duration should be no longer than two weeks. Following these consultations with rheumatology specialists the design of the study was presented to the NHS ethics committee and was given a favourable ethical opinion. Another ethical issue which is presented as a strength of the research programme was that all participants in the control group of the study reported in chapter three and four were offered a choice of imagery or hypnotherapy intervention following the control period. Incidentally, no participant declined the offer.

Mixed methodologies. An objective of the research programme was to provide training in the research process. By using mixed methodologies, specifically a randomised controlled trial approach and a case study approach, the present author gained an understanding of these different types of research methodologies. Furthermore, using different methodologies within this research programme also gave the present author the opportunity of valuable experience of working collaboratively with patients and health service providers in designing the studies presented in this thesis.

Applied focus. A particular strength of the present research programme was its applied focus. Participants of this research programme were patients with a chronic disease. Associated with the advantages of conducting applied research, there are some

disadvantages in terms of time. For example studies involving patients from the NHS requires additional ethical permission, which can be a lengthy procedure. Furthermore, recruiting patients to participate in such studies can also involve additional time, for example going to clinics and identifying possible participants.

Informing RA group at local hospital. Part of this research programme, which can be considered a strength, involved attending the local hospital rheumatology multidisciplinary team meeting. It was during those meetings that the present author was able to demonstrate how imagery and hypnotherapy might be used for patients with RA and present interim findings to the rheumatology group. This undoubtedly helped with recruitment and offered the rheumatology MDT the opportunity to ask questions and find out more about the studies presented in this thesis. Furthermore, it helped to foster a good working relationship between two institutions, namely the university and the hospital.

Weaknesses of the Research Programme

Applied versus theoretical focus. The objectives of this research programme were not to explicitly examine the theory related to imagery and hypnotherapy, but to utilise these two psychosocial interventions in a clinical population, specifically RA patients, with an applied focus. Notwithstanding the objectives of the research programme, the use of psychosocial interventions in clinical populations should be informed by theory (Salkovskis, 2002). However, throughout the health research literature, studies employing these two psychosocial interventions often fail to provide theoretical rationale for their use, or to explain the possible mechanisms of change. The present author acknowledges that in order to understand the mechanisms that underpin the clinical effects following an imagery or hypnotherapy it is essential to gain some insight from theories related to these

two psychosocial interventions. Although there was not a theoretical focus to the present thesis, several theoretical mechanisms were discussed, for example Cautela and Kearney (1990) behaviour theory, Bandura's (1977) self-efficacy theory, and Melzack's (2001) gate control theory, with respect to changes in dependent variables, throughout this thesis.

Attention control groups. A potential weakness in the research programme is the lack of an attentional control group. The objective of attentional control groups is different from a 'care-as-usual' control group in that the former takes into account participant expectations and attention received by taking part in the research and thus tests the null hypothesis more stringently (Bootzin, 1985). Therefore the beneficial changes observed in the dependent variables of this research programme may not be due to the interventions, but may be the result of non-specific therapeutic effects (e.g., effects of attention, positive regard, and therapeutic alliance).

The decision not to include an attention control group was based on interpreting the available literature. For example in a recent meta analyses Jensen, Weersing, Hoagwood, and Goldman (2005) identified 14 out of 29 studies reported significant differences between the active intervention group and the attention control group, indicating that the effects of the psychosocial intervention were not dependent on non-specific therapeutic factors. Furthermore, two studies, specifically involving the psychosocial interventions utilised in the present thesis were identified which included an attention control group. Huth, Broome, & Good (2004) investigated the effects of an imagery intervention following surgery and Saadat et al., (2006) investigated the effects of hypnotherapy for post-operative anxiety. Both these studies reported significant

differences between the active intervention group and the attention control group, with no significant differences between the attention control group and the 'care as usual' control group. The fact that there was no significant differences between the attention and 'care as usual' control groups provides some evidence for not including an attention control group specifically for imagery and hypnotherapy interventions. Therefore, within the present research programme there was no attention control group in any of the studies.

However, in order to identify possible non-specific therapeutic effects, participants completed a post-experimental questionnaire which examined expectancy, hope, and reaction to randomisation, and a modified perceived social support questionnaire which included perceived social support from the experimenter. Although in chapter three it was reported that there were no significant correlations between variables in the post-experimental questionnaire, or the modified perceived social support questionnaire, and changes in HRQOL, there were some significant correlations reported in chapter four. Specifically there was a significant correlation between pain reduction, decreased functional disability, and perceived social support from the experimenter. Furthermore, there was also a significant correlation between reaction to randomisation and decreased physical fatigue and decreased functional disability. Consequently, the results presented in chapter four should be interpreted with caution because of these significant relationships. Furthermore, future studies involving psychosocial interventions should include an attention control group.

Volunteer bias. A common limitation of many studies involving psychosocial interventions for chronic disease is volunteer or self-selection bias (Malani, 2008). In cases where the objective of the study is to examine the effect of a particular intervention

in a specific group of patients, such as the present thesis, randomisation does not eliminate the problem of volunteer bias (Heckman & Smith, 1995). Volunteer bias was particularly evident in the first study reported in chapters three and four. Specifically, only 22 out of the 102 patients who were invited to take part in this study at the rheumatology clinic, accepted the invitation. Unfortunately the number of patients invited to participate in the study reported in chapter five was not recorded. However, the rheumatology nurses involved in recruitment commented that many people were less enthusiastic to participate in this study for two reasons. First, the amount of time required in participating and second, preconceived ideas of what hypnotherapy was (even though definitions of imagery and hypnotherapy were on the patient information sheet).

Volunteer bias may compromise external validity and therefore generalisability of results.

However, in keeping with a patient-centred focus, if these psychosocial interventions were made available, then the likelihood of patients with no interest using them would probably be very low. Indeed, irrespective of volunteer bias in the research, patient preference and choice still exist outside the realms of a research study.

Future Research Directions

Although this thesis adds value to the literature on psychosocial interventions in RA, it also raises important questions which require future research attention. The use of PROMs in HRQOL is increasing (Emery, Perrier, & Acquadro, 2005) reflecting a growing awareness of the importance of a patient-centred approach to the treatment of chronic disease (Kushida et al., 2007). With the growth of HRQOL PROMs it is crucial that the appropriate measure is chosen (Joyce et al., 1999; Garratt et al., 2002; Arnold et al., 2004). In chapter three it was identified that the SF-36 did not fully capture what

patients reported as their HRQOL. However, other HRQOL widely used include the EuroQOL EQ-5D (Brooks, 1996) and the Nottingham Health Profile (NHP; Hunt, McEwan, & McKenna, 1986). Given the importance of HRQOL in chronic diseases future research should investigate whether the items in these HRQOL measures are able to capture what an individual perceives as being important.

On reflection, the decision not to include an attentional control group, based on the present author's interpretation of evidence from the literature, was incorrect. The results in chapter four indicated that there was a significant relationship between reductions in pain and functional disability, and perceived social support from the experimenter. Contrary to Gross (2005) and following the results above, attentional control groups enhance scientific rigour, and as such future studies using psychosocial interventions should employ a suitable attention control group.

It was suggested that a possible explanation for the differences between the two psychosocial interventions was the induction procedure, which is similar to relaxation (Gay et al., 2002) in hypnotherapy and not in the imagery intervention. However, as there was no relaxation group in any of the studies, this explanation is speculative. Imagery is an integral component of hypnotherapy, a replication study involving a combined relaxation and imagery intervention might confirm whether the induction procedure in hypnotherapy was responsible for the added benefit reported in chapters three and four.

In chapter five it was reported that both imagery and hypnotherapy interventions improved psychosocial function and in some cases biological markers of disease activity in active RA patients. The results from this study provide some evidence that imagery and hypnotherapy influencing the biology of the disease. However, it is not possible to

conduct a randomised controlled trial to investigate the effects of imagery and hypnotherapy in active RA as it is no longer considered ethical to leave patients with active RA without drugs (Haslock, 1989; Stein & Pincus, 1999). Nevertheless, it would be possible to conduct a randomised trial using imagery and hypnotherapy in recently diagnosed RA patients all receiving the same anti-rheumatic medication. Such a study would identify whether the inclusion of imagery or hypnotherapy with anti-rheumatic medication improves psychosocial function and disease activity more than anti-rheumatic medication alone.

Applied Clinical Directions

The PGI was used throughout the research programme to enhance a patient-centred approach to the research. In the UK the National Health Service (NHS) has adopted a strategy in creating a patient-led NHS, giving patients greater choice and control of treatment (Department of Health, 2005). This strategy reflects the growing awareness of the changing roles of patients as service users and physicians as service providers, the need for increased satisfaction in service provision, and a change in focus from disease to understanding the patient's perspective (Epstein et al., 2005). It has been acknowledged that the focus from the disease to the person integrates a patient-centred focus, rather than a physician-centred, or disease-centred focus (Silverman, 1987; Stewart, 2001). Therefore using the PGI in clinical practice will increase patient-centredness and contribute to the aims of the strategy adopted by the NHS in creating a patient-led NHS.

Specifically in clinical practice, the use of measures such as the PGI should facilitate greater patient-centredness through improved patient-clinician communication

(Gilbody, Whitty, Grimshaw, & Thomas, 2003), and identification of patient preferences enabling shared power and responsibility for goals of treatment (Lindblad, Ring, Glimelius, & Hansson, 2002). Indeed, in chronic diseases such as RA this is important as patient-centredness is associated with greater patient satisfaction, adherence to medication and rehabilitation programmes, and better overall health outcome (Stewart, 1995)

Another applied clinical direction which comes out of this research programme could be educational programmes instructing RA health care providers how to use imagery and hypnotherapy in everyday practice. Both these interventions are simple to use and can easily be adopted as a self-management programme. Additionally, adverse side effects are minimal and infrequent (Astin et al., 2003) which may increase their appeal as self-management techniques.

Conclusion

Reflecting on the research process which culminated in the production of this thesis, the mnemonic *FINER* suggested by Hartrick (2008) for aiding systematic reflection of the research process is employed. Specifically, Hartrick (2008) argues that high quality studies should be feasible, interesting, novel, ethical, and relevant.

The present research programme may lack some feasibility in that sample size of the study reported in chapter three and four were low. With small sample sizes Stevens (1996) suggests that the alpha levels should be adjusted to compensate for lower power. However, the power of the primary outcome measure used in this study indicated a sufficient sample size. Investigation of psychosocial interventions in patients with active RA raised ethical concerns which meant a large randomised control trial could not be

conducted. Therefore a case study approach was employed in chapter five. Ten participants were included in this study. In terms of sample sizes for case studies this is a large sample size.

The use of imagery and hypnotherapy as psychosocial interventions in patients with RA was interesting due to the direct interface with patients required for this research programme together with the breadth of research required to understand the specialist areas of patient-centredness and psychosocial approaches to chronic disease. Furthermore, the results of this research were the subject of considerable interest by both local and national press. The results from this research programme also demonstrate that these psychosocial interventions significantly improved several areas of psychosocial function and in some patients decreased disease activity. These results strengthen the evidence for the use of these interventions in clinical practice, and should engender further research in these areas.

The research programme was novel in several ways. Many of the strengths of this research programme reflect this. First, throughout the research programme the PGI was used to enhance a patient-centred approach, not only in the design, but also the administration of the intervention. Although several studies have employed a 'tailored' intervention approach where participants could choose from a number of pre-selected modules, for example Zauta et al. (2008), to the best of the present author's knowledge, no published studies exist where the intervention was based exclusively on what participants had identified as being important.

Throughout the research programme a number of steps were taken to avoid unethical study design. First, a consultant rheumatologist was involved in the design of

each study. Second, study protocols were presented to a local NHS research ethics committee before the commencement of any research. Furthermore, presentations were made to a local NHS rheumatology department at interim stages of the research programme for feedback. These steps ensured that ethical guidelines were strictly adhered to throughout the research programme.

Finally, Hartrick (2008) suggests that research in clinical practice must be relevant. He suggests asking the question, “Who will care?” (Hartrick, 2008, p. 435). Considering that RA has a physical, social, and economic impact not only on the patient, but also their families and society, the answer to this question involves many parties. First, the patient who has improved health related quality of life and improved psychosocial functioning will care. Second, the families and carers of those patients will also care. Third, the health care providers of RA patients, for example, GP’s, rheumatology specialist nurses and consultants will also care. Finally, if these psychosocial interventions significantly improve both the psychosocial and physical health of the patient then it may reduce the burden on health care resources, therefore policy makers may also care.

In conclusion, the primary objective of this research thesis was to investigate the use of imagery and hypnotherapy as psychosocial interventions in RA patients. A secondary objective was to provide training in research. In the present author’s opinion these objectives were successfully achieved in the thesis. Specifically, using a patient centred approach these two psychosocial interventions were utilised to examine their effects on the symptoms associated with this disease. Allowing participants to direct the areas for therapeutic change, and using patient reported outcome measures ensured that a

patient centred approach was enhanced throughout the research programme. The results from the studies indicate a therapeutic benefit following the use of imagery or hypnotherapy, although determining which provides the better outcome is difficult to ascertain from the results. Specifically, hypnotherapy proved significantly better than imagery for stable RA patients, however imagery provided more clinically significant changes for active RA patients.

This research contributes to the knowledge base of psychosocial interventions in RA, specifically the use of imagery as a single therapeutic mode, and has also provided several areas for additional research, and has implications for clinical practice. The secondary objective of this research programme was to provide training in research, from inception of the research question to dissemination of research findings. The training provided by this research programme has provided me with the research skills necessary to conduct further research and to be able to pass these skills to other future researchers.

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APPENDIX A

QUESTIONNAIRE PACK

PATIENT GENERATED INDEX OF QUALITY OF LIFE

Your answers to the following steps will tell us how your life has been affected by Rheumatoid Arthritis. It will also tell us how you would like to see your life improved.

Step 1: Identifying Areas

We would like you to think of the most important areas of your life that are affected by your rheumatoid arthritis.

Please write up to FIVE areas in the boxes below.

Step 2: Scoring each Area

In this part we would like you to score the areas you mentioned in step 1. This score should show how badly affected you are. Please score each area out of 10 using this scale:

10 = exactly as you would like it to be
9 = close to how you would like it to be
8 = very good but not how you would like it to be
7 = good but not how you would like it to be
6 = between good a fair
5 = fair
4 = between poor and fair
3 = poor bit not the worst you could imagine
2 = very poor but not the worst you could imagine
1 = close to the worst you could imagine
0 = the worst you could imagine

Step 3: Spending Points

We want you to imagine that any or all of the areas you mentioned could be improved. You have 12 points to spend to show which areas you would most like to see improvement.

Spend more points on the areas you would like to see improvements and less on areas that are not so important.

You have 12 points to spend.

Areas affected by other health problems		

YOUR PAIN AND FATIGUE

Your Pain

Please take a moment and put a cross on the line below that you think represents your pain in the last week.

For example if you had experienced little or no pain during the past week your cross would be near the left hand side of the line.

None
be

X

As bad as it could
be

None
be

As bad as it could
be

Your Physical Fatigue

Please take a moment and put a cross on the line below that you think represents your pain in the last week.

None
be

As bad as it could
be

Your Mental Fatigue

Please take a moment and put a cross on the line below that you think represents your pain in the last week.

None
be

As bad as it could
be

PAIN ANXIETY SYMPTOM SCALE

Individuals who experience pain develop different ways to respond to that pain. We would like to know what you do and what you think about when in pain. Please use the rating scale below to indicate how often you engage in each of the following thoughts or activities. Circle any number from 0 (NEVER) to 5 (ALWAYS) for each item.

		Never			Always		
		0	1	2	3	4	5
1	I think that if my pain gets too severe, it will never decrease						
2	When I feel pain I am afraid that something terrible will happen						
3	I go immediately to bed when I feel severe pain						
4	I begin trebling when engaged in an activity that increases pain						
5	I can't think straight when I am in pain						
6	I will stop any activity as soon as I sense pain coming on						
7	Pain seems to cause my heart to pound or race						
8	As soon as pain comes on I take medication						
9	When I feel pain I think that I may be seriously ill						
10	During painful episodes it is difficult for me to think of anything else besides the pain						
11	I avoid important activities when I hurt						
12	When I sense pain I feel dizzy or faint						
13	Pain sensations are terrifying						
14	When I hurt I think about the pain constantly						
15	Pain makes me nauseous (feel sick)						
16	When pain comes on strong I think I might become paralyzed or more disabled						
17	I find it hard to concentrate when I hurt						
18	I find it hard to calm my body down after periods of pain						
19	I worry when I am in pain						
20	I try to avoid activities that cause pain						

ARTHRITIS SELF EFFICACY

For each of the following questions, please circle the number that corresponds to how certain you are that you can do the following tasks regularly at the present time.

Self-Efficacy Pain Scale

- | | | | | | | | | | | | |
|---|--|--------------|---|---|---|---|---|--------------|---|---|----|
| 1 | How certain are you that you can decrease your pain quite a bit? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | | very certain | | | | | | very certain | | | |
| 2 | How certain are you that you can keep arthritis pain from interfering with daily activities? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | | very certain | | | | | | very certain | | | |
| 3 | How certain are you that you can keep arthritis pain from interfering with your sleep? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | | very certain | | | | | | very certain | | | |
| 4 | How certain are you that you can make a small-to-moderate reduction in your arthritis pain by using other methods other than extra medication? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | | very certain | | | | | | very certain | | | |
| 5 | How certain are you that you can make a large reduction in your arthritis pain by using methods other than taking extra medication? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | | very certain | | | | | | very certain | | | |

Self-Efficacy Function Scale

- | | | | | | | | | | | | |
|---|---|-----------------|---|---|---|---|---|-----------------|---|---|----|
| 1 | How certain are you that you can walk 100ft on flat ground in 20 seconds? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | | very
certain | | | | | | very
certain | | | |
-
- | | | | | | | | | | | | |
|---|---|-----------------|---|---|---|---|---|-----------------|---|---|----|
| 2 | How certain are you that you can walk 10 steps downstairs in 7 seconds? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | | very
certain | | | | | | very
certain | | | |

- | | | | | | | | | | | | |
|----------|---|--------------|----------|----------|----------|----------|----------|----------|----------|--------------|-----------|
| 3 | How certain are you that you can get out of an armchair quickly, without using your hands for support? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | | very certain | | | | | | | | very certain | |
| 4 | How certain are you that you can button and unbutton 3 medium-sized buttons in a row in 12 seconds? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | | very certain | | | | | | | | very certain | |
| 5 | How certain are you that you can cut 2 bite-size pieces of meat with a knife and fork in 8 seconds? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | | very certain | | | | | | | | very certain | |
| 6 | How certain are you that you can turn an outdoor faucet all the way off? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | | very certain | | | | | | | | very certain | |
| 7 | How certain are you that you can scratch your upper back with both your right and left hands? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | | very certain | | | | | | | | very certain | |
| 8 | How certain are you that you can get in and out of the passenger side of a car without assistance from another person without physical aids? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | | very certain | | | | | | | | very certain | |
| 9 | How certain are you that you can put on a long-sleeve front opening shirt or blouse (without buttoning) in 8 seconds? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | | very certain | | | | | | | | very certain | |

HEATH ASSESSMENT QUESTIONNAIRE

In this section we are interested in leaning how your illness affects your ability to function in daily life. Please feel free to add any comments on the back of this page,

Please CIRCLE the number which describes your usual abilities OVER THE PAST WEEK.

	without ANY difficulty	with SOME difficulty	with MUCH difficulty	UNABLE to do
Dressing & Grooming				
Are you able to:				
Dress yourself including tying shoelaces and undoing buttons?	0	1	2	3
Shampoo your hair?	0	1	2	3
Arising				
Are you able to:				
Stand up from a straight chair?	0	1	2	3
Get in and out of bed?	0	1	2	3
Eating				
Are you able:				
Cut your meat?	0	1	2	3
Lift a full cup or glass to your mouth?	0	1	2	3
Open a new milk carton?	0	1	2	3
Walking				
Are you able to:				
Walk outdoors on flat ground?	0	1	2	3
Climb up five stairs?	0	1	2	3

Please tick the boxes that you usually use for any of the activities:

- ☐ Cane
- ☐ Walker
- ☐ Crutches
- ☐ Wheelchair
- ☐ Devices used in dressing
- ☐ Built up or special utensils
- ☐ Special or built up chair
- ☐ Other (Specify:)

Please tick the boxes for which you usually need HELP FROM ANOTHER PERSON

- ☐ Dressing and Grooming
- ☐ Eating
- ☐ Arsing
- ☐ Walking

Please **CIRCLE** the number which best describes your usual abilities **OVER THE PAST WEEK**.

	without ANY difficulty	with SOME difficulty	with MUCH difficulty	UNABLE to do
Hygiene				
Are you able to:				
Wash and dry your body?	0	1	2	3
Take a bath	0	1	2	3
Get on and off the toilet?	0	1	2	3
Reach				
Are you able to:				
Reach and get down a 5lb object from just above your head?	0	1	2	3
Bend down and pick up clothing from the ground?	0	1	2	3
Grip				
Are you able to:				
Open car doors?	0	1	2	3
Open jars?	0	1	2	3
Turn taps on and off?	0	1	2	3
Activities				
Are you able to:				
Run errands and shop?	0	1	2	3
Get in and out of a car?	0	1	2	3
Do chores such as vacuuming or yard work?	0	1	2	3

Please tick the boxes that you usually use for any of the activities:

- ☐ Raised toilet seat
- ☐ Bathtub bar
- ☐ Bathtub seat
- ☐ Long-handed appliances for reach
- ☐ Jar opener
- ☐ Long-handed appliances for reach
- ☐ Other (Specify:)

Please tick the boxes for which you usually need **HELP FROM ANOTHER PERSON**

- ☐ Hygiene
- ☐ Gripping and opening things
- ☐ Reach
- ☐ Errands and chores

Your Health and Well-being

This survey asks for your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities.
For each of the following question, please tick the one box that best describes your answer.

1. In general, would you say your health is:

Excellent	Very good	Good	Fair	Poor
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. Compared to one year ago, how would you rate your health in general now?

Much better now than one year ago	Somewhat better now than one year ago	About the same as one year ago	Somewhat worse now than one year ago	Much worse now than one year ago
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. The following questions are about you might do during a typical day. Does your health now limit you in these activities? If so, how much?

	Yes limited a lot	Yes, limited a little	No, not limited at all
Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lifting or carrying groceries	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Climbing several flights of stairs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Climbing one flight of stairs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bending, kneeling, or stooping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walking more than a mile	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walking several hundred yards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walking one hundred yards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bathing or dressing yourself	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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

Not at all	A little bit	Moderately	Quite a bit	Extremely
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks.

	All of the time	Most of the time	Some of the time	A little of the time	None of the time
Did you feel full of life?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have you been very nervous?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have you felt so down in the dumps that nothing could cheer you up?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have you felt calm and peaceful?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Did you have a lot of energy?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have you felt downhearted and low?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Did you feel won out?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have you been happy?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Did you feel tired?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10. During the past 4 weeks, how much of the time has your physical health or emotional problems interfere with your social activities (like visiting with friends, relative, etc.)?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11. How TRUE or FALSE is each of the following statement for you?

	Definitely true	Mostly true	Don't Know	Mostly false	Definitely false
I seem to get ill more easily than other people	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am as healthy as anybody I know	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I expect my health to get worse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My health is excellent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

APPENDIX B

Post Experimental Questionnaire

Please read over the following questions carefully. In questions 1 to 6, please circle the number you feel is your answer. For the other questions please write your answer.

Q1. Thinking back to when you first decided to take part in this study, what did you EXPECT would be the change in your condition?

No change		Very Little change		A little change		Some change		A Lot of change		
0	1	2	3	4	5	6	7	8	9	10

Q2. Thinking back to when you first decided to take part in this study, what did you HOPE would be the change in your condition?

No change		Very Little change		A little change		Some change		A Lot of change		
0	1	2	3	4	5	6	7	8	9	10

Q3. You were randomised to the imagery group. What was your initial reaction to this?

Very dissatisfied	Quite dissatisfied		Neither satisfied nor dissatisfied		Quite satisfied		Very satisfied			
0	1	2	3	4	5	6	7	8	9	10

Q4. How often did you use the CD's during the first 6 weeks? (the first six weeks when you met with the experimenter).

Never	Less than twice a week		More than twice a week		Every other day		Every day		Twice a day or more	
0	1	2	3	4	5	6	7	8	9	10

Q5. How often did you use the CD's, after the first 6 weeks, during the next 6 months?

Never	Less than twice a week		More than twice a week		Every other day		Every day	Twice a day or more		
0	1	2	3	4	5	6	7	8	9	10

Q6. How easy did you find it to fit listening to the CD's into your schedule?

Very difficult		Quite difficult		Neither easy nor difficult			Quite easily		Very easily	
0	1	2	3	4	5	6	7	8	9	10

APPENDIX C

The statements below refer to your feelings and experiences which occur to most people at one time or another in their relationships with **friends**. For each statement there are three possible answers: Yes, No, Don't know.

1. My friends give me the moral support I need.	Yes	No	Don't Know
2. Most other people are closer to their friends than I am.	Yes	No	Don't Know
3. My friends enjoy hearing about what I think.	Yes	No	Don't Know
4. Certain friends come to me when I have problems or need advice.	Yes	No	Don't Know
5. I rely on my friends for emotional support.	Yes	No	Don't Know
6. If I felt that one or more of my friends were upset with me, I'd just keep it to myself.	Yes	No	Don't Know
7. I feel that I am on the fringe with my circle of friends.	Yes	No	Don't Know
8. There is a friend that I could go to if I were feeling down, without feeling funny about it later.	Yes	No	Don't Know
9. My friends and I are very open about what we think about things.	Yes	No	Don't Know
10. My friends are sensitive to my personal needs.	Yes	No	Don't Know
11. My friends come to me for emotional support.	Yes	No	Don't Know
12. My friends are good at helping me solve problems.	Yes	No	Don't Know
13. I have a deep sharing relationship with a number of friends.	Yes	No	Don't Know
14. My friends get good ideas about how to do things or make things from me.	Yes	No	Don't Know
15. When I confide in friends it makes me feel uncomfortable.	Yes	No	Don't Know
16. My friends seek me out for companionship.	Yes	No	Don't Know
17. I think that my friends feel that I'm good at helping them solve problems.	Yes	No	Don't Know
18. I don't have a relationship with a friend that is as intimate as other people's relationships with friends.	Yes	No	Don't Know
19. I've recently gotten a good idea about how to do something from a friend.	Yes	No	Don't Know
20. I wish my friends were much different.	Yes	No	Don't Know

The statements which follow now refer to feelings and experiences which occur to most people at some point or another in their relationships with their **families**. Again, for each statement there is three possible answers: Yes, No, and Don't know. Please write your answer next to each statement.

- | | | | |
|--|-----|----|------------|
| 1. My family gives me the moral support I need. | Yes | No | Don't Know |
| 2. I get good ideas about how to do things or make things from my family. | Yes | No | Don't Know |
| 3. Most people are closer to their family than I am. | Yes | No | Don't Know |
| 4. When I confide in the members of my family who are closest to me, I get the idea that it makes them feel uncomfortable. | Yes | No | Don't Know |
| 5. My family enjoys hearing about what I think. | Yes | No | Don't Know |
| 6. Members of my family share many of my interests. | Yes | No | Don't Know |
| 7. Certain members of my family come to me when they have problems or need advice. | Yes | No | Don't Know |
| 8. I rely on my family for emotional support. | Yes | No | Don't Know |
| 9. There is a member of my family I could go to if I was feeling down, without feeling funny about it later. | Yes | No | Don't Know |
| 10. My family and I are open about what we think about things. | Yes | No | Don't Know |
| 11. My family are sensitive to my personal needs. | Yes | No | Don't Know |
| 12. Members of my family come to me for emotional support. | Yes | No | Don't Know |
| 13. Members of my family are good at helping me to solve problems. | Yes | No | Don't Know |
| 14. I have a deep sharing relationship with a number of members of my family. | Yes | No | Don't Know |
| 15. Members of my family get good ideas about how to do things or make things from me. | Yes | No | Don't Know |
| 16. When I confide in my family it makes me feel uncomfortable. | Yes | No | Don't Know |
| 17. Members of my family seek me out for companionship. | Yes | No | Don't Know |
| 18. I think my family feels that I'm good at helping them solve problems. | Yes | No | Don't Know |
| 19. I don't have a relationship with a member of my family that is as close as other people's relationships with family members. | Yes | No | Don't Know |
| 20. I wish my family were much different. | Yes | No | Don't Know |

These sets of statements refer to feelings and experiences which occurred to you when you were taking part in the research study with the **experimenter**. For each statement there are three possible answers: Yes, No and Don't know. Please write your answer beside each statement.

- | | | | |
|---|-----|----|------------|
| 1. The experimenter gave me the emotional support I needed. | Yes | No | Don't Know |
| 2. I got good ideas about how to do things or make things from the experimenter. | Yes | No | Don't Know |
| 3. Most other participants were closer to the experimenter than I was. | Yes | No | Don't Know |
| 4. When I confided the experimenter I got the idea it made them uncomfortable. | Yes | No | Don't Know |
| 5. The experimenter enjoyed hearing about what I think. | Yes | No | Don't Know |
| 6. The experimenter shared many of my interests. | Yes | No | Don't Know |
| 7. The experimenter could come to me when they had a problem or needed advice. | Yes | No | Don't Know |
| 8. I relied on the experimenter for emotional support. | Yes | No | Don't Know |
| 9. The experimenter was someone I could go to when I felt down without feeling funny about it later. | Yes | No | Don't Know |
| 10. The experimenter and I were open about what we think about things. | Yes | No | Don't Know |
| 11. The experimenter was sensitive to my personal needs. | Yes | No | Don't Know |
| 12. The experimenter came to me for emotional support. | Yes | No | Don't Know |
| 13. The experimenter was good at helping me solve my problems. | Yes | No | Don't Know |
| 14. I have a deep sharing relationship with the experimenter. | Yes | No | Don't Know |
| 15. The experimenter got good ideas about how to do things or make things from me. | Yes | No | Don't Know |
| 16. When I confide in the experimenter it makes me feel uncomfortable. | Yes | No | Don't Know |
| 17. I think the experimenter thought I was good at helping them solve problems. | Yes | No | Don't Know |
| 18. I didn't have a relationship with the experimenter as close as other participants relationship with the experimenter. | Yes | No | Don't Know |
| 19. I wish the experimenter was much different. | Yes | No | Don't Know |

Thank you for answering these questions.

APPENDIX D

EXAMPLE OF AN IMAGERY INTERVENTION

Participant AB randomised to the imagery intervention group.

Session 1 – Same session given to all participants in the imagery group. This was a general introduction to imagery. The principle aim of this session was to help participant AB to use as many sensory modalities as possible, for example, sight, smell, taste, hearing, and touch.

Within this introductory session participant AB was asked to imagine picking up an orange from a fruit bowl, peeling the orange with her fingers and eating a segment of the orange. During the session she was invited to describe as many things as possible. For example participant AB said that the fruit bowl was made of glass and had flowers etched around the sides. She was encouraged to describe how her hands felt as she picked up the orange from the glass fruit bowl, the texture of the orange in her hand and to imagine the smell of the orange. Participant AB was then asked to imagine starting to peel the orange, and to imagine hearing the skin of the orange tear away from the fruit. She was also asked to imagine that she could see the zest of the orange splashing over her fingers as she tore at the skin. Finally, participant AB was asked to imagine taking one segment of the orange and eating it. She was encouraged to talk about how this felt and any physiological reactions she had to this imagery session.

Session 2 – This session was based on the individual item identified in the PGI: *‘Spending time with the grandchildren without feeling tired’*

Before the imagery session commenced participant AB identified that she enjoys playing football with her two grandsons in the garden. However, as she tires so quickly she cannot play as long as she and her grandsons would like to. At the beginning of the imagery session participant AB was encouraged to imagine herself in the garden with her grandchildren playing football. She was asked to describe the surroundings and provide as much information as possible about the environment, including visual, auditory, kinaesthetic, and emotional information. Throughout the session she was encouraged to imagine how her muscles and joints were working as she kicked the ball gently to her grandson and his reaction when he managed to save the ball going into the net. Participant AB was also encouraged to imagine her energy levels increasing as she played and enjoyed the game. Participant AB reported that she would visualise a thermometer like object to represent her energy levels and how she would increase this by turning a valve on at the bottom of the thermometer to increase her energy level and prevent tiredness. A primary focus would be on the pleasurable aspect of being able to spend time in this activity with her grandsons without being tired.

APPENDIX E

EXAMPLE OF A HYPNOTHERAPY INTERVENTION

Participant CD was randomised to the hypnotherapy group.

Session 1 – Same session given to all participants in the hypnotherapy group. This was a general introduction to hypnotherapy. The principle aim of this session was to help participant CD become familiar with the use of hypnotherapy.

Within this introductory session participant CD was asked to focus her eyes on a spot on her hand. She was given verbal suggestions that her eyelids were becoming heavier and heavier, until she felt that she wanted to close her eyelids. It was then suggested to her that she would go into a deeper hypnotic trance as the experimenter counted down from six to zero. After this deepening procedure participant CD was asked to imagine taking an orange from a fruit bowl, similarly to participant AB in the imagery group. She was asked to imagine picking up an orange from a fruit bowl, peeling the orange with her fingers and eating a segment of the orange. During the session she was invited to describe as many things as possible. She was encouraged to describe how her hands felt as she picked up the orange from the glass fruit bowl, the texture of the orange in her hand and to imagine the smell of the orange. Next participant CD was asked to imagine starting to peel the orange, and to imagine hearing the skin of the orange tear away from the fruit. She was also asked to imagine that she could see the zest of the orange splashing over her fingers as she tore at the skin. Finally, participant CD was asked to imagine taking one segment of the orange and eating it. After this it was suggested to participant CD that she would gradually start to reorient herself as the experimenter counted up from zero to six.

Session 2 – This session was based on the individual item identified in the PGI: *'Spending too much time in bed in the morning because of pain in her knees'*

Before the hypnotherapy session commenced CD identified that she felt as though she spent too much time in bed in the morning because of pain in her knees. She said that the pain often stopped her from doing things she had to get done, for example housework and shopping. Using the same procedure as in the introductory session, participant CD focussed her eyes on a spot on her hands and continued with the deepening procedure, counting down from six to zero. It was then suggested to participant CD that she was inside a control room that represented her brain, and that this room was full of dials and digital read-outs. Whilst in this room she was instructed to find the dial that represented the pain sensation in her knees. After identifying the correct dial, participant CD was instructed to breath in as she reached up for that dial, and to breath out as she turned the dial down. This was repeated several times before she was then asked to imagine herself getting out of bed in the morning with no pain in her knees. Towards the end of the session participant CD was then asked reorient herself and open her eyes by the time the experimenter counted up from zero to six.

PERSONAL STATEMENT

Before starting this research programme I had often heard many other PhD students and graduates say how their life was on hold until they finished their thesis. Naively, I thought that life was too short to put on hold, and with several years of research and clinical experience behind me I would not have to put my life on hold.

For me this research programme was more than ‘doing’ research. It was a particularly steep learning curve. At the start I really enjoyed what I was ‘doing’. Designing the studies, recruiting patients, administering the interventions, and collecting data. This is the part I enjoyed the most. However, conducting a research programme is a whole lot more than this.

Within submitting the first draft of the first study it became apparent that my greatest weakness (apart from taking instruction!) was academic writing. I was (and perhaps still am!) hopeless at it. Finding and collecting information related to the research area – not a problem. However, structuring it into a critical piece of work....hmmm, I had lots to learn.

During the last year of this research programme I have never worked so hard, never tried so hard, and put my life on ‘hold’. And it was tiring – not only for me, but also my supervisors. Without their help and tuition I have no doubts that I would not be submitting this thesis today – or anytime in the near future. Finishing the task and writing the thesis was a lengthy process of writing then taking irrelevant parts out, and adding more relevant parts in, which culminated in this written piece of work. Although it was a struggle for me to produce this thesis, I believe that it has not taken away the exciting findings that have come out of the research. This thesis identifies that areas such as health related quality of life, specifically how this construct is operationalised and measured, needs further attention, it also identifies that imagery and hypnotherapy, these simple and easily applied psychosocial interventions helped many participants, and may even had influenced the biology of their disease. For me this has been exciting.

Therefore, asking myself if I would do it all again, I have to be honest and say that I would. The past four years of this research programme has enriched my life. I have learnt so much more than I thought I would at the start. I have met many wonderful people who have taught me valuable skills and life lessons. I would do it all again if I had to. Would I change anything if I had to do it all over again? I probably would. I would focus more on academic writing at the very start.