Beyond the negative: The role of positive metacognitions, meta-emotions and maladaptive metacognitions in depression, anxiety and life satisfaction in individuals with Vasculitis

Helen Mayor

Supervised by: Dr Rob Sanders

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ABSTRACT

As a result of the challenge of adapting to a chronic illness, psychological disorder can occur in individuals with Vasculitis. However, positive outcomes of successful adaptation have also been reported. The present study aimed to investigate the contributors to both positive adaptation, measured by life satisfaction and maladaptation, measured by depression and anxiety. An association has been found between maladaptive metacognitions and psychological distress. Recent research has highlighted that positive metacognitions and meta-emotions are also important for successful psychological functioning. One hundred and thirty-two participants aged 20-78yrs, recruited from Vasculitis charity websites completed an online questionnaire assessing maladaptive metacognitions (MCQ-30), positive metacognitions meta-emotions (PMCEQ-18), depression (PHQ-9), anxiety (GAD-7) and life satisfaction (SWLS). Demographic and disease-related data (type of Vasculitis, length of illness, disease activity status, prednisolone dosage and number of medications) were also collected. Statistical analysis found MCQ-30 total scores to negatively correlate with life satisfaction and positively correlate with depression and anxiety. PMCEQ-18 factor scores were found to positively correlate with life satisfaction and negatively correlate with depression and anxiety. Multiple linear regression revealed a model which accounted for 43.3% of the variance in life satisfaction. One MCQ-30 factor and two PMCEQ-18 factors were found to be significant predictors of life satisfaction. In addition, ANOVA analyses revealed individuals with high MCQ- 30 total scores and low PMCEQ-18 factor scores had significantly higher levels of anxiety and depression. Implications of these findings are discussed in relation to practical applications that may assist individuals with Vasculitis to adapt successfully. Directions for future research are also identified.

KEY WORDS:	VASCULITIS	DEPRESSION	ANXIETY	LIFE SATISFACTION	METACOGNITIONS

Introduction

Vasculitis is an incurable but treatable group of rare illnesses characterised by inflammation of the blood vessels. The global annual incidence of Vasculitis is 10-20 per million, with a peak age of onset of 65-74yrs (Lane, Watts & Scott, 2005). The annual incidence of Vasculitis within the United Kingdom has been reported as 19.6 per million (Watts et al., 2004). There are approximately twenty different types of this autoimmune condition, each differing in the size of blood vessels affected and the organs involved (Jennette et al., 1994; Jennette et al., 2013). For example, Giant Cell Arteritis and Takayasu's Arteritis are large vessel conditions, affecting the aorta and major arteries. Kawasaki Disease and Polyarteritis Nodosa are medium vessels conditions affecting small to large arteries. Granulomatosis with Polyangiitis, Churg-Strauss Syndrome, Microscopic Polyangiitis and Henoch-Schonlein Purpura are all small vessels conditions affecting arterioles, capillaries, veins and venules, in addition to larger blood vessels in some cases. The organs affected are therefore dependent on the type of Vasculitis but often the lungs, kidneys, skin and joints can be involved (Chakravarty, 1997). Corticosteroids and immunosuppressant drugs are used to control the immune reaction.

Due to developments in medical knowledge, the status of Vasculitis has changed from a fatal condition to a chronic illness (Lane, Watts, Shepstone et al., 2005). Individuals are therefore coping with pain, fatigue, side effects of medication and the remitting/relapsing nature of Vasculitis on a long-term basis (Koutantji, 2000). Consequently, the psychological impact can be significant as individuals endeavour to adapt to the issues associated with the chronicity of the illness.

Psychological aspects of illness and particularly adaptation to chronic conditions have been well researched. Adaptation can be defined as a "response to a change in the environment that allows an organism to become more suitably adapted to that change." (Sharpe & Curran, 2006, p.1154). Traditionally, a lack of psychopathology has been used to indicate successful adaptation to chronic illness (Stanton & Revenson, 2007). Similarly, Vasculitis studies have used the presence of psychological disorders such as anxiety and depression to indicate poor adjustment (Koutantji et al., 2003). While Stanton and Revenson (2007) agree that insight into maladaptation is valuable, they argue adaptation should not be measured purely by a lack of psychopathology, but should also include positive outcomes of the illness. Folkman and Moskowitz (2000) also forward this viewpoint, suggesting that positive and negative affect can co-exist when dealing with chronic illness. Consistent with this, although levels of depression were found to be high in AIDS patients and their carers high levels of positive affect were also reported (Folkman, 1997). Additionally, Vasculitis research has found patients with Takayasu's Arteritis to report increased happiness levels and increased overall mood subsequent to becoming ill (Abularrage et al., 2008).

Positive outcomes such as benefit-finding and post-traumatic growth have also been reported by individuals with chronic illness, suggesting personal gain can be made from the experience of living with an illness (Danoff-Burg & Revenson, 2005; Katz et al., 2001). Consequently, adaptation has been measured by indicators such as quality of life (QOL), positive affect, subjective well-being and self-esteem (Sharpe & Curran, 2006). Such concepts are the domain of positive psychology. This branch of psychology aims to understand psychological strengths and positive attributes in

individuals, refocusing research on adaptive psychological functioning rather than seeking to explain psychopathology (Seligman & Csikszentmihalyi, 2000).

There is a relative lack of research into psychological adaptation in individuals with Vasculitis. Stanton and Revenson (2007) highlight that factors such as disease progression, disability, prognosis and severity vary greatly between illnesses, therefore, research from one chronic illness should not be generalised to another. Vasculitis studies have previously utilised QOL measures to indicate adaptation (Basu et al., 2010; Carpenter et al., 2009; Koutantji et al., 2003; Walsh et al., 2011). Although, mental health is often assessed as one component of health-related QOL, the focus has such studies has not been to research the possible predictors of psychological adaptation specifically. Additionally, past research has investigated the impact of Vasculitis disease factors on QOL, rather the contribution of individual psychological factors to adaptation. Koutantji et al. (2000) highlights that while research has identified positive mental health outcomes in Vasculitis, there is a lack of research into the possible determinates of these outcomes and the mechanisms through which they may occur.

In order to investigate psychological adaptation in Vasculitis, the present study examined the contribution of the individual cognitive factors of positive metacognitions and meta-emotions and maladaptive metacognitions to anxiety, depression and life satisfaction. The evidence base for each of these psychological concepts will be subsequently discussed.

1.1. Metacognitions

Metacognition has been explored in relation to its role in psychological disorders and can be conceptualised as "…the psychological structures, knowledge, events and processes that are involved in the control, modification and interpretation of thinking itself" (Wells & Cartwright-Hatton, 2004, p.386). A metacognitive model to explain the occurrence and maintenance of psychopathology has been developed. The self-regulatory executive function (S-REF) model posits three levels of cognitive processing to explain the relationship between appraisal, attention and self-beliefs (Wells & Matthews, 1994). In the first level automatic processing of internal and external information about the current situation occurs. In the second, controlled processing of appraisals and regulation of behaviour occurs. The third contains a store of self-beliefs and affects the prior levels due to pre-held beliefs contributing to interpretation of incoming information. The S-REF metacognitive process is proposed to influence self-knowledge by integrating information from low-level processing into self-belief stores.

Wells and Matthews (1994) suggest psychological disorders occur when maladaptive metacognitions lead to coping strategies, such as rumination, that are ineffective in dealing with challenging situations. Cognitive-attentional syndrome (CAS), where attention capacity for external information beneficial to adaptation becomes limited due to intense self-focus, is thought to increase susceptibility to psychological disorder (Wells & Matthew, 1994). In support of this, high levels of self-focus have been found to be associated with anxiety in threatening situations (Wells, 1991). The S-REF model also makes a distinction between two operative modes activated during a challenging situation (Wells and Matthews, 1994). In object mode, perseverative dysfunctional S-REF activity occurs due to troubling thoughts being

taken as representing reality and activating maladaptive coping to reduce the perceived threat. In metacognitive mode, thoughts are taken as events to be analysed, resulting in adaptive behaviour based on reflective evaluation of the situation and also allowing integration of new knowledge into self-belief stores. Individuals with high levels of maladaptive metacognitions are likely to utilise the object mode of processing in challenging situations and therefore are more vulnerable to emotional disorders (Wells & Matthews, 1994).

Based on the S-REF model the Metacognitions Questionnaire-30 (MCQ-30, Cartwright-Hatton & Wells, 1997) was developed to measure maladaptive metacognition. The questionnaire contains five distinct factors. These are (1) Positive Beliefs about Worry, i.e. considering worrying to be helpful, (2) Negative Beliefs about Worry Concerning Uncontrollability and Danger, i.e. believing worry cannot be managed or suppressed, (3) Cognitive Confidence, i.e. self-confidence in cognitive abilities such as memory or attention, (4) Beliefs about the Need to Control Thoughts, i.e. thinking negative thoughts should be managed and (5) Cognitive Self-Consciousness, i.e. the inclination to concentrate on cognitive processes.

Research has found MCQ factors two, three and four to be consistently related to psychopathology. Spada et al. (2008) found all three factors to positively correlate with perceived stress, anxiety and depression as measured by the Perceived Stress Scale and Hospital Anxiety and Depression scale (Cohen; Zigmond & Snaith, as cited in Spada et al., 2008). Correspondingly, research has found a significant relationship between both positive and negative metacognitive beliefs about rumination and depression (Papageorgiou & Wells, 2003). Individuals with Generalised Anxiety Disorder (GAD) have also been found to score higher on factor two, negative beliefs about worry concerning uncontrollability and danger, compared to individuals with panic disorder, social phobia and non-patients (Wells & Carter, 2001). In relation to chronic illness, Allott et al. (2005) found maladaptive metacognitions to predict depression and anxiety in individuals with Parkinson's disease. Consistent with the other research factor two, was found to be the strongest predictor of anxiety and depression. Despite Parkinson's disease and Vasculitis having very different pathologies and clinical manifestations, Allott et al. (2005) suggest these findings may be replicated in future investigations of other chronic illnesses.

1.2. Positive Metacognitions and Meta-emotions

Influenced by positive psychology, Beer and Moneta (2010) argue an absence of maladaptive metacognitions is insufficient to explain successful adaptation, proposing that positive metacognitions are additionally required. Furthermore, Beer and Moneta (2010) suggest both object and metacognitive modes can be adaptive with the caveat that metacognitive mode must follow object mode. This allows progress towards successful problem-solving through evaluation of thoughts initially taken as representing reality, thus avoiding maintenance of maladaptive coping strategies. It is also suggested that favourable psychological outcomes are dependent upon metacognitive beliefs that assist identification of alternative and flexible goals in the midst of a challenging situation.

Within the S-REF model, emotions are suggested to be a result of meta-cognitive and cognitive processing (Wells & Matthews, 1994). However, Beer and Moneta

(2010) argue that emotions can arise independently of cognitive processes and highlight the importance of positive meta-emotions in psychological adaptation. Meta-emotions can be defined as “emotional reactions about one’s own emotions” (Mitmansgruber et al., 2009, p448.). They have been found to predict psychological well-being beyond that of mindfulness and experiential avoidance, constructs that have previously been shown to affect emotion regulation (Mitmansgruber et al., 2009). It is suggested that meta-emotions influence the experience of the primary emotion, for example being anxious about anxiety will produce a different experience than being angry about anxiety. Beer and Moneta (2010) incorporate this explanation into the suggestion that interest and curiosity in one’s own emotions are required for adaptive metacognitive beliefs to occur. Inquisitorial thought is initially required to direct attention towards evaluation of the emotion.

In order to measure these concepts, the Positive Metacognitions and Positive Meta-Emotions Questionnaire (PMCEQ-18, Beer & Moneta, 2010) was developed and factor analysis revealed three distinct factors. The first, Confidence in Extinguishing Perseverative Thoughts and Emotions, is to some extent the opposite of the maladaptive metacognitions measured by the MCQ. In particular, strong correlation is reported between this factor and the MCQ factor of Negative Beliefs about Worry Concerning Uncontrollability and Danger. The second factor is Confidence in Interpreting Own Emotions as Cues and indicates the meta-emotional component suggested as important for successful functioning. The final factor, Confidence in Setting Flexible and Feasible Hierarchies of Goals, reflects the adaptive use of goals suggested to be required for progressing to metacognitive mode from object mode. Beer and Moneta (2010) report the scale to have good psychometric properties. As a relatively new measure, the PMCEQ-18 has not been widely utilised thus far, therefore, the current study presents an opportunity to further examine the reliability of this scale.

A positive association between adaptive metacognitions and meta-emotions and adaptive coping has been found (Beer & Moneta, 2012). The inverse correlation was found for maladaptive coping and perceived stress, controlling for maladaptive metacognitions. Beer and Moneta (2012) utilise the transactional model of stress (Lazarus & Folkman, 1984) in order to explain these findings. Lazarus and Folkman (1984) suggest that two processes occur within the transactional model; cognitive appraisal and coping. Primary appraisal processes assess the level of threat, resulting in perception of the stressor as producing harm, producing the probability of future harm or producing a challenge to be dealt with. Secondary appraisals assess the resources available to deal with the threat. Lazarus and Folkman (1984) propose coping occurs as a result of these cognitive appraisals and is the efforts of an individual to neutralise the stressor both through cognitive and behavioural mechanisms. Beer and Moneta (2012) suggest that high levels of the factors measured by the PMCEQ contribute to ensuring the appraisal process results in the situation being evaluated as a challenge rather than a threat. Consequently, adaptive coping processes are employed and the likelihood of maladaptive coping occurring is reduced.

1.3. Depression and Anxiety

In a global study, Moussavi et al. (2007) found depression to be 2-3 times more likely to occur in individuals with chronic illness compared to the general population.

According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) Major Depressive Disorder can be defined as the occurrence of symptoms such as depressed mood, little pleasure in daily activities, fatigue, insomnia, weight loss and lack of concentration causing significant distress and impairing daily functioning (American Psychiatric Association, APA, 2005). Similarly, anxiety has been found to be more prevalent in individuals with chronic conditions (Scott et al., 2007). Generalised Anxiety Disorder (GAD) can be defined as excessive uncontrollable worry with the occurrence of physical symptoms such as fatigue, restlessness, lack of concentration, irritability and sleep disturbance also impairing daily functioning (APA, 2005). Elevated levels of depression and anxiety are also found within Vasculitis populations. A recent study of individuals with Granulomatosis with Polyangiitis found 22% of the sample to have depression, compared to 7.6% in the general population (Hajj-Ali, et al, 2011). Consistent with this, Kountantji et al. (2003) reported 25.5% of participants with Vasculitis had symptoms of depression and 43.2% reported problems with anxiety, compared to a base rate of 7% in the general population. Therefore, psychological distress is a significant problem in Vasculitis patients.

Psychological distress in chronic illness can impact upon important illness-related outcomes. For example, depression has been found to influence adherence to treatment. A meta-analysis found non-adherence to be three times more likely to occur in individuals with depression (DiMatteo et al., 2000). Correspondingly, Carpenter et al. (in press) found depression to be a significant predictor of medication non-adherence in Vasculitis patients. In addition, evidence from the field of psychoneuroimmunology has found negative emotions to promote the production of pro-inflammatory cytokines resulting in increased inflammation and infection (Kiecolt-Glaser et al., 2002). Wilcocks et al. (2010) report infection has been associated with relapse in Vasculitis due to re-activating dysfunctional autoimmune responses. Therefore, the study of depression and anxiety has important clinical implications for disease management and the prevention of relapses.

Investigation of psychological distress in patient populations requires several methodological issues to be taken into consideration. General psychiatric measures of depression and anxiety often include indicators of distress which refer to physical health such as headache or weight loss (Hermann, 1997). This is problematic due to physical health issues being indistinguishable from illness symptoms in individuals with a medical condition. In addition, measures aimed at diagnosing psychiatric disorders may have too high a threshold for identifying mild psychological distress in patients. Therefore, measures that are validated specifically for physical health populations should be utilised.

In addition, factors related to chronic illness and Vasculitis specifically may moderate the relationship between predictor variables and the outcome variables of depression and anxiety. Treatment with corticosteroids to reduce inflammation is common in Vasculitis, however, there can be psychiatric side effects of this medication. In a review of adverse effects, Warrington and Bostwick (2006) state that corticosteroids can induce a wide-range of disorders but most common are mania and depression. They also report corticosteroid dosage is associated with the incidence of psychological disorders. Therefore, when examining distress in Vasculitis patients the possible effects of corticosteroid treatment and dosage should be considered.

Additionally, age has been found to negatively correlate with the mental health component of a health-related QOL measure in a study of individuals with Vasculits (Faurschou et al., 2010). There is also evidence that disease status can moderate mental QOL, Carpenter et al. (2011) found individuals in the relapsing stage of Vasculitis to have lower mental QOL than those who were in remission. Although mental health subscales of QOL measures are not specific to depression and anxiety, they are designed to measure general mental health, which would be expected to be affected if depression or anxiety were present. Consequently, age and disease status should also be considered when investigating psychological distress.

1.4. Life Satisfaction.

The concept of life satisfaction (LS) is a component of the positive psychology idea of subjective well-being (SWB). Diener et al. (2005) define SWB as "a person's cognitive and affective evaluations or his or her life" (p.63). Affective evaluations represent the experience of both positive and negative emotional reactions to situations. While cognitive evaluations relate to a more global assessment of happiness in terms of life satisfaction. Diener et al. (1985) highlight that judgement of LS is reliant upon internal comparison with self-set criteria for life satisfaction, rather than externally dictated criteria.

Life satisfaction has been identified as an important element of positive adaptation to chronic illness (deRidder et al., 2008). Consistent with this, Bussing et al. (2009) found LS to correlate positively with health-related QOL in individuals with chronic illness. Moreover, not only did individuals without illness have higher LS scores compared to those with chronic illness but there were variations in LS scores between the chronic illnesses investigated. Individuals with cancer were found to have the highest level of LS whilst individuals with chronic pain conditions were found to have the lowest levels. Correspondingly, a large nationwide United States based survey found LS to be lower in people with chronic illness (Strine et al., 2008) Furthermore, LS was found to influence health risk behaviours such as smoking, obesity, physical inactivity and alcohol consumption. While behaviours such as those outlined above may not be as relevant to some chronic illnesses, health behaviours such as adherence to treatment and self-management of the illness are of particular importance (Hertz, 2013). The research discussed highlights that living with chronic illness can impact upon LS and that the level of impact is dependent on the type of illness. Consequently, it is of importance to investigate LS in specific illnesses such as Vasculitis.

Despite research pointing to lower levels of LS in individuals with chronic illness, positive outcomes of facing adversity are often reported, such as benefit-finding and stress-related or posttraumatic growth (Linley & Joseph, 2004a; Tedeschi & Calhoun, 2004b). Evidence relating specifically to chronic illness has found perceived benefit to predict adaptation to the illness in terms of both psychological and physical health in individuals with Rheumatoid Arthritis and Multiple Sclerosis (Evers et al, 2001). Therefore, it is clear that for some individuals the stress associated with chronic illness can provide the opportunity for personal growth. Elliot et al. (2005) propose that perceived benefit and personal growth are conceptually related to LS, suggesting growth can be indicated by high levels of subjective well-being and LS. They suggest LS measures provide the opportunity to reflect upon

positive growth with respect to the challenges and changes an individual may have faced. Consistent with this, the Revised Stress-Related Growth Scale (Armeli et al., 2001) includes a LS component, further indicating the relatedness of the two concepts. With regard to the impact of other variables on life satisfaction, Diener et al. (1999) highlight that in addition to traits and cognitive dispositions, situational influences and demographic variables can impact upon LS. Therefore, age and situational differences in terms of the illness will be measured in order to control for any potential extraneous effects.

A link between interpretation of illness and coping strategy has been identified in recent research. Bussing and Fischer (2009) found negative loss or threat interpretations to be associated with maladaptive coping such as avoidance, while positive challenge interpretations were associated with adaptive coping such as reappraisal. The study also found negative interpretations to be negatively correlated with life satisfaction. This suggests a mechanism through which positive metacognitions and meta-emotions may impact upon positive outcomes of illness such as life satisfaction. Due to evidence of a relationship between positive metacognition and adaptive coping (Beer & Moneta, 2012), it is reasonable to suggest that such metacognitions allow favourable appraisals or interpretations of illness as a challenge rather than a threat. Subsequently, adaptive coping and satisfaction with life is promoted.

Further explanation of the metacognition-life satisfaction link can be provided by considering the argument of Diener (2000) that SWB is dependent on the ability to be flexible in goal setting. It is suggested that individuals who manage their goals in order to accommodate a new situation adapt more successfully than those who do not. This flexibility in goal-setting is directly reflected in factor 3 of the PMCEQ; Confidence in Setting Flexible and Feasible Hierarchies of Goals. Consequently, it would be expected that high levels of this factor would correlate with high levels of life satisfaction.

In consideration of the theoretical and empirical basis of the concepts presented, the current study aimed to further investigate the role of adaptive metacognitions and meta-emotions in adaptation to Vasculitis. Prior studies suggest positive adaptation requires not only an absence of maladaptive metacognitive traits but also a presence of adaptive metacognitions and meta-emotions. Therefore, three distinct multiple linear regressions were utilised to assess the influence of the predictor variables of the five MCQ factors and the three PMCEQ factors score on the criterion variables of depression, anxiety and life satisfaction. Based on the literature discussed, it was hypothesised that MCQ factors would positively predict negative adaptation to chronic illness measured by the criterion variables of anxiety and depression. Furthermore, it was predicted that PMCEQ factors would be negatively associated with anxiety and depression. It was also hypothesised that, in addition, to MCQ factors being negatively associated with the criterion variable of life satisfaction, PMCEQ factors would positively predict life satisfaction.

Method

Participants

An opportunity sample was recruited from two UK based Vasculitis charities; Vasculitis UK and The Lauren Currie Twilight Foundation and one US based charity; the Vasculitis foundation. Participants less than 18yrs old were not accepted to participate due to ethical issues. The sample comprised 132 participants, 100 (75.8%) were female, 31 (23.5%) were male and one (0.8%) participant did not disclose their gender. This is an overrepresentation of females as Vasculitis has been found to be slightly more common in males (Lane, Watts & Scott, 2005). Age ranged from 20-78yrs (*M*=50.98, *SD*=14.12). Previous Vasculitis studies report a mean age of 63yrs, therefore, the current sample mean age is consistent with this (Lane, Watts, Shepstone et al., 2005; Watts et al., 2000). The length of illness question was omitted by some participants, 59 (44.7%) provided an answer with a mean illness length of 6.24yrs (*SD*= 6.98).

Table 1 demonstrates the diverse geographical characteristics of the population, with participants residing in eight different countries. The majority of the sample resided in the UK and US (66 participants (50.0%) and 50 participants (37.9%) respectively). The number of participants with each type of Vasculitis is presented in table 2. Wegener's Granulomatosis/Granulomatosis with Polyangiitis was the most common type (61 participants, 46.2%). This is representative of the Vasculitis population, as incidence rates for this sub-type are significantly higher (Lane, Watts & Scott, 2005). Similarly, table 3 outlines the activity status of Vasculitis in the population sample. The majority of participants (60, 45.4%) were in drug-maintained remission, with the least number of participants (7, 5.3%) having severely active Vasculits. Table 4 and 5 presents the severity of depression and anxiety within the sample. No depression or anxiety was most common (38 participants, 28.8%, and 52 participants, 39.4%, respectively). Severe depression (14 participants, 10.6%) and moderate anxiety (14 participants, 10.6%) were the least common.

Table 1
Geographical characteristics of the study population

Country of Residence	***n* (%)**
Australia	4 (3.0%)
Canada	7 (5.3%)
Croatia	1 (0.8%)
Mexico	1 (0.8%)
New Zealand	2 (1.5%)
United Kingdom	66 (50.0%)
United States	50 (37.9%)
Turkey	1 (0.8%)

Table 2
Number and percentage of Vasculitis type within the sample

VasculitisType	*n* (%)
Behcet's Disease	3 (2.3%)
Central Nervous System	5 (3.8%)
Churg Strauss Syndrome	11 (8.3%)
Cryoglobulinemia	1 (0.8%)
Giant Cell Arteritis	6 (4.5%)
Henoch-Schönlein Purpura	1 (0.8%)
Hypersensitivity Vasculitis	2 (1.5%)
Microscopic Polyangiitis	14 (10.6%)
Polyarteritis Nodosa	6 (4.5%)
Rheumatoid Vasculitis	1 (0.8%)
Takayasu's Arteritis	6 (4.5%)
Urticarial Vasculitis	4 (3.0%)
Wegener's Granulomatosis/ Granulomatosis with Polyangiitis	61 (46.2%)
Other	11 (8.3%)

Table 3
Number and percentage of Vasculitis activity status within the sample

Vasculitis Activity Status	*n* (%)
Complete remission	11 (8.3%)
Drug maintained remission	60 (45.4%)
Mildly active	30 (22.7%)
Moderately active	24 (18.2%)
Severely active	7 (5.3%)

Table 4
Severity of depression with the study sample as measured by the Patient Health Questionnaire (PHQ-9)

Severity of Depression*	*n* (%)
No depression	38 (28.8%)
Mild	36 (27.3%)
Moderate	22 (16.7%)
Moderately severe	22 (16.7%)
Severe	14 (10.6%)

**According to categorisation of Kroenke et al. (2001).*

Table 5
Severity of anxiety within the study sample as measured by the Generalised Anxiety Disorder questionnaire (GAD-7)

Severity of Anxiety*	***n* (%)**
No Anxiety	52 (39.4%)
Mild	45 (34.1%)
Moderate	14 (10.6%)
Severe	21 (15.9%)

**According to categorisation of Spitzer et al. (2006).*

Design

A cross-sectional survey design was used. Correlation and multiple linear regression were utilised to analyse the data. The predictor variables were; the five factors of the MCQ and the three factors of the PMCEQ. Anxiety, depression and life satisfaction were the criterion variables. Extraneous variables such as patient age, daily prednisolone dosage and number of medications were also entered into the analysis in order to control for any potential effects.

Materials

An electronic survey, utilising SelectSurvey.net, was designed to include questions relating to demographics (age, gender and county of residence) and questions relating to the disease (type of Vasculitis, length of illness, disease activity status prednisolone dosage and number of medications), see appendix I. This was then followed by five self-report questionnaires, each of which is outlined below.

Metacognitions Questionnaire (MCQ-30, Wells & Cartwright-Hatton, 2004) (See Appendix II).

MCQ-30 measures five metacognitive traits that are related to psychopathology. The five factors are (1) Positive Beliefs about Worry, i.e. considering worrying to be helpful. (2) Negative Beliefs about Worry concerning Uncontrollability and Danger, i.e. believing worry cannot be managed or suppressed. (3) Cognitive Confidence, i.e. self-confidence in cognitive abilities such a memory or attention. (4) Beliefs about the Need to Control Thoughts, i.e. thinking negative thoughts should be managed. (5) Cognitive Self-Consciousness, i.e. the inclination to concentrate on cognitive processes. Each trait is measured by six items giving a thirty item scale. Participants are asked to express their agreement with a statement for each item. Items are scored on a four point scale with answers of ‘do not agree’, ‘agree slightly’, ‘agree moderately’ and ‘agree very much’ corresponding to scores of 1-4 respectively. A high score indicates a high level of each trait. Scores for each factor have a range of 6-24 and are combined to give an overall score of metacognitions, ranging from 30-120. MCQ-30 has been found to have good internal consistency with Cronbach’s Alpha ranging from 0.72-0.93 and good convergent validity (Wells & Cartwright-Hatton, 2004).

Positive Metacognitions and Meta-emotions Questionnaire (PMCEQ-18, Beer & Moneta, 2010) (See Appendix III).

PMCEQ-18 was developed to measure adaptive metacognitions and meta-emotions. The scale has a three factor structure. Factor 1 is Confidence in Extinguishing Perseverative Thoughts and Emotions, i.e. possessing self-assurance in preventing rumination. Factor 2 is Confidence in Interpreting Own Emotions as Cues, i.e. the ability to control overreaction to negative emotions. Factor 3 is Confidence in Setting Flexible and Feasible Hierarchies of Goals, i.e. self-regulation in directing efforts towards goals. Each factor is measured by six items giving an eighteen item scale in total. Participants are asked to express their agreement with a statement for each item. Items are scored on a four point scale with do not agree', 'agree slightly', 'agree moderately' and 'agree strongly' corresponding to scores of 1-4 respectively. A high score indicates a high level of each factor. Scores for each factor have a range of 6-24 and are combined to give an overall score of adaptive metacognitions and meta-emotions ranging from 18-72. Items 1,4,7,10,13 and 16 are reverse scored. The measure has been found to have good construct and concurrent validity and internal reliability with Cronbach's Alpha ranging between 0.80-0.88 (Beer & Moneta, 2010).

Patient Health Questionnaire (PHQ-9, Kroenke et al., 2001) (See appendix IV).

PHQ-9 was designed to both diagnose and assess the severity of major depressive disorder according to DSM-IV criteria in patient populations. The scale contains nine items. Participants rate how often they have experienced symptoms of depression in the past two weeks. Items are scored on a four point scale from (0) Not at all, (1) Several days, (2) More than half the days, (3) Nearly Every Day. Scores are combined to produce a total depression severity score ranging from 0-27. Mild depression is indicated by a score of 5-9, moderate a score of 10-14, moderately severe a score of 15-19 and severe a score of 20-27.

The PHQ-9 has been found to have excellent internal reliability (Cronbach's α between 0.86 and 0.89) and good construct and concurrent validity (Kroenke et al., 2001). In addition, a meta-analysis found the scale to have good psychometric properties across several countries, illness populations and medical settings (Gilbody et al., 2007). Percentages of depression levels for the validation sample of US primary care and obstetrics-gynaecology patients for no depression, mild, moderate, moderately severe and severe were; 61.6%, 20.7%, 8.3%, 6.2%, and 3.2% respectively (Kroenke et al., 2001), see table 4 for percentage levels of each category within the present study population. Kroenke et al. (2001) also report a mean PHQ-9 score of 5.1 within the patient sample. The PHQ-9 has also been validated for use in the general population, a mean score of 3.9 was found and 5.4% of the sample obtained mild depression scores while 3.8% obtained moderate to severe depression scores (Martin et al., 2006).

Generalised Anxiety Disorder Scale (GAD-7, Spitzer et al., 2006) (See Appendix V).

GAD-7 assesses the severity of generalised anxiety disorders against DSM-IV criteria in patient populations. The scale contains seven items. Participants rate how often they have experienced specific symptoms of anxiety in the past two weeks. Items are scored on the same scale as PHQ-9. A total anxiety severity score is obtained, ranging from 0-21. Mild anxiety is indicated by a score of 5-9, moderate a

score of 10-14 and severe a score of 15-21. The GAD-7 has been found to have excellent internal reliability (Cronbach's α = 0.92) and good construct and concurrent validity (Spitzer et al., 2006). Percentages of anxiety levels for the validation sample of primary care patients for no anxiety, mild, moderate and severe anxiety were; 55.6%, 24%, 12.4% and 8.0% respectively. See table 5 for percentage levels of each category within the current study population. The mean GAD-7 score in this sample was 5.6 (Spitzer et al., 2006). General population validation of the GAD-7 found 5% of participants had moderate anxiety and 1% had severe anxiety (Lowe et al., 2008)

The Satisfaction with Life Scale (SWLS, Diener et al., 1985) (See Appendix VI).

This scale measures global life satisfaction and consists of five items scored on a seven point scale indicating level of agreement with the five item statements (1 and 7 indicating strongly disagree and strongly agree, respectively). A total life satisfaction score is produced ranging from 5-35, with a higher score corresponding to higher life satisfaction. The SWLS has been found to have excellent internal reliability (Cronbach's α = 0.87), good construct validity and good criterion validity (Diener et al., 1985). Relevant to the present study, it has also been found to have good reliability and validity in a non-psychiatric medical outpatient population (Arrindell et al., 1991). In a review of the SWLS, Pavot and Diener (1993) present normative data for the scale. It is highlighted that study population sample scores were 23-28, representing slight satisfaction with life on the scale. In the medical outpatient sample, Arrindell et al. (1991) found the range of participant scores to be 19-25 and therefore are slightly lower than the general population.

Procedure

The study was approved by the York St John Psychology ethical committee (see Appendix VII). The survey was presented on the charity websites outlined above and permission was also given to post the survey on the charities' Facebook pages. An initial information page (see appendix VIII) detailed the aims and requirements of the study, allowing individuals to give their informed consent to participate. In line with the British Psychological Society standard of self-determination (BPS, 2009), participants were informed that they may discontinue at any point and questions they did not wish to answer should be left blank. Creation of a pseudonym to facilitate identification of the data enabled withdrawal after completion of the questionnaire. Confidentiality and anonymity were assured. To comply with the BPS ethical standard of protection of research participants (BPS, 2009), participants were signposted to their medical practitioners should they feel any distress as a result of completing the questionnaire.

Participants were asked to complete the questionnaire consisting firstly of demographic and disease related questions as outlined above and followed by the MCQ-30, PMCEQ-18, GAD-7, SWLS and PHQ-9 in that order. The questionnaire took no more than 15 minutes to complete.

Results

The mean and standard deviation of each criterion variable and the predictor variables are presented in table 6. MCQ Factor three, Cognitive Confidence, had the highest mean score (*M*=14.61, *SD*= 4.03) while MCQ factor two, Negative Beliefs about Worry concerning Uncontrollability and Danger, had the lowest (*M*=9.17, *SD*= 3.70). The highest scoring factor for PMCEQ-18 was factor one, Confidence in Extinguishing Perseverative Thoughts and Emotions, (*M*=16.18, SD= 4.86) while factor 2, Confidence in Interpreting Own Emotions as Cues, was the lowest (*M*=13.64, *SD*= 3.83). The mean score for PHQ-9 (*M*=9.89, *SD*= 6.81) and GAD-7 (*M*= 7.02, *SD*= 5.75) are both higher than those previously reported in patient populations (5.1 and 5.6 respectively) (Kroenke et al., 2001; Spitzer et al., 2006). The mean scores are indicative of an average level of mild depression and mild anxiety in the study sample. The mean score for SWLS (*M*= 18.55, *SD*= 8.24) is at the lower end of the range previously found in patient populations (19-25) (Arrindell et al., 1991). This represents an average level of 'slightly dissatisfied with life' within the study sample.

Table 6
Descriptive statistics of predictor and criterion variables

Variable	*M*	*SD*	Range
Age	50.98	14.12	20-78
Prednisolone Dosage (mg)	6.49	9.55	0-60
Number of Medications	4.40	3.46	0-17
MCQ Factor 1	11.82	4.83	5-24
MCQ Factor 2	9.17	3.70	5-22
MCQ Factor 3	14.61	4.03	7-24
MCQ Factor 4	13.17	4.39	6-24
MCQ Factor 5	10.24	3.67	6-23
MCQ Total	59.00	13.99	33-107
PMCEQ Factor 1	16.18	4.86	6-24
PMCEQ Factor 2	13.64	3.83	6-24
PMCEQ Factor 3	15.74	4.44	6-24
PMCEQ Total	42.93	7.06	18-58
PHQ-9	9.89	6.81	0-27
GAD-7	7.02	5.75	0-21
SWLS	18.55	8.24	5-35

Kolmogorov-Smirnov tests were used to examine whether the data was normally distributed and found that the data for the age variable met this assumption, *D*(132)=0.67, *p*=ns. However, data for all other variables was not normally distributed (see appendix IX for normality tests). Homogeneity of variance was calculated by hand and the data also failed to meet this assumption (14.12/3.46=4.08).

As the data was non-parametric, Spearman's Rho correlations were calculated between predictor and criterion variables as presented in table 7 (see appendix X for scattergraphs and Spearman's Rho calculations).

Table 7
Spearman's Rho correlation coefficients for predictor and criterion variables

	Age	Prednisolone	Medicationnumber	MCQF1	MCQF2	MCQF3	MCQF4	MCQF5	MCQTotal	PMCEQF1	PMCEQF2	PMCEQF3	PMCEQTotal
GAD	-.403**	.168	.153	.301**	.272**	.272**	.484**	.340**	.499**	-.675**	-.413**	-.489**	-.045
PHQ	-.360**	.248**	.286**	.404**	.149	.255**	.444**	.255**	.480**	-.596**	-.290**	-.379**	.023
SWLS	.147	-.280**	-.120	-.210*	-.101	-.106	-.459**	-.175*	-.325**	.517**	.391**	.534**	.189*

* p<0.05, **p<0.01.

Table 8
Pearson's correlations coefficients between predictor and criterion variables.

	Age	Prednisolone	Medication number	MCQ F1	MCQ F2	MCQ F3	MCQ F4	MCQ F5	MCQ Total	PMC EQF1	PMC EQF2	PMC EQF3	PMC EQTotal
GAD	-.357**	.242**	.127	.391**	.311**	.317**	.557**	.435**	.598**	-.653**	-.347**	-.411**	.043
PHQ	-.306**	.231**	.213*	.427**	.181*	.298**	.482**	.333**	.520**	-.597**	-.251**	-.325**	.120
SWLS	.120	-.197*	-.087	-.271**	-.075	-.110	-.463**	-.224**	-.349**	.542**	.439**	.553**	.281**

*p<0.05, **p<0.01

Pearson's correlation were also calculated (Table 8), although there were differences in significant correlations for PHQ and GAD, there was no difference in significant correlations between these parametric and non-parametric tests for SWLS. Therefore, despite not meeting the assumptions of parametric statistics a simultaneous multiple regression was calculated to examine whether SWLS could be predicted by MCQ-30 factor scores and PMCEQ-18 factor scores. Age, prednisolone dosage and number of medications were also entered into the analysis in order to examine any potential predictive power of these variables.

Results of the regression analysis found a significant model, $F(11,120) = 8.32$, $p<0.05$, which accounted for 43.3% of the variance, $r^2 = 0.433$. The individual contribution of each predictor variable is shown in table 9.

Table 9
Beta values for the constant, age, prednisolone dosage, medication number, MCQ factors and PMCEQ factors for SWLS.

SWLS	*b*	SE β	β	t
(Constant)	9.404	5.633		
Age	-.018	.043	-.031	-.423
Prednisolone	-.065	.063	-.075	-1.032
Medicationnumber	-.113	.171	-.047	-.660
MCQF1	-.012	.135	-.007	-.092
MCQF2	.022	.163	.010	.133
MCQF3	.064	.179	.031	.357
MCQF4	-.449	.215	-.239	-2.083*
MCQF5	.006	.210	.003	.031
PMCEQF1	.356	.175	.210	2.040*
PMCEQF2	-.027	.238	-.012	-.113
PMCEQF3	.665	.199	.363	3.342**

*p<0.05, **p, 0.00

As multiple linear regression could not be utilised to examine the effect of metacognitions and positive metacognitions on depression and anxiety, two-way independent ANOVA analyses were calculated. Data were split into two groups for MCQ total scores, spilt at the median in order to create high and low score groups of roughly equal sizes. As table 7 shows PMCEQ total was not significantly correlated with PHQ and GAD, therefore the three individual factors of PMCEQ were used and also spilt into two groups of high and low scores at the median. The median score was included in the high group for both MCQ total and PMCEQ factors. Subsequently three 2x2 ANOVA analyses for each outcome variable were implemented.

Post-Hoc ANOVAs for Depression

As table 10 shows participants with high MCQ total scores and low PMCEQ factor 1 scores had the highest depression scores. Participants with low MCQ total scores and high PMCEQ factor 1 scores had the lowest depression scores. In terms of MCQ total only, participants with high scores had the highest depression scores. In terms of PMCEQ factor 1, participants with low scores had the highest depression scores.

Table 10
Descriptive statistics for PHQ scores by PMCEQ factor one and MCQ total.

		PMCEQ Factor 1		
		Low PMCEQF1 (*n*=55)	High PMCEQF1 (*n*=77)	Total (*n*=132)
MCQ Total	Low MCQ (*n*=62)	10.76 (6.38)	6.00 (4.47)	7.16 (5.36)
	High MCQ (*n*=70)	14.92 (6.56)	9.88 (6.65)	12.97 (6.99)
	Total (*n*=132)	13.64 (6.73)	7.21 (5.50)	

Kolmogorov-Smirnov tests were used to examine whether the data were normally distributed and found the data for low MCQ, D(62)= 0.15, p<0.05 and high PMCEQF1, D(77)= 0.15, p<0.05 , to be not normally distributed. Data for high MCQ, D(70)= 0.09, p=ns and low PMCEQF1, D(55)= 0.11, p=ns were normally distributed. Additionally, results of Levene's test of homogeneity of variance found the variance across the two MCQ total conditions, F(1,130)= 6.46, <0.05 and across the two PMCEQ factor 1 conditions, F(1,130)= 4.79, <0.05, to be unequal. Therefore, the data did not meet the assumptions of parametric statistics. However, Howell (2002) argues that ANOVA tests are robust tests and can be used despite the violation of parametric assumptions. Furthermore, in relation to homogeneity of variance Howell (2002) suggests that if the largest standard deviation does not exceed the smallest by more than 4 times, an ANOVA can still be used. This was found to be the case for both MCQ conditions (6.99/5.36= 1.30) and both PMCEQ factor 1 conditions (6.73/5.5= 1.22). Therefore, differences in the conditions were examined using a 2x2 independent ANOVA.
A significant main effect was found for MCQ total, F(1,128)=13.19, p<0.05, η^2=0.09, post hoc power=0.95. A significant main effect was also found for PMCEQ factor 1, F(1,128)=19.68, p<0.05, η^2=0.13, post hoc power=0.99. As figure 1 shows there was a non-significant interaction, F(1,128)=0.02, p=ns, η^2=0.00, post hoc power=0.05.

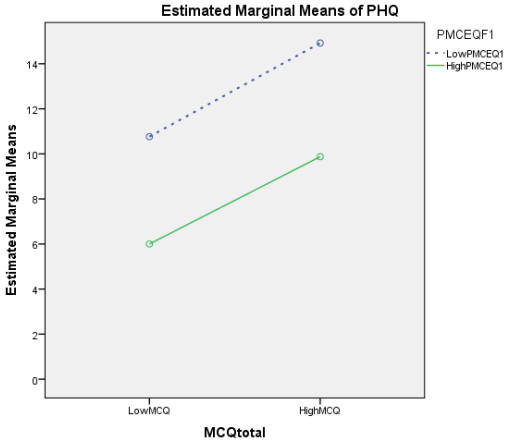

Figure 1: Interaction between MCQ total and PMCEQF1 factors for PHQ scores

As table 11 shows participants with high MCQ total scores and low PMCEQ factor 2 scores had the highest depression scores. Participants with low MCQ total scores and high PMCEQ factor 2 scores had the lowest depression scores. In terms of PMCEQ factor 2 only, participants with low scores had the highest depression scores.

Table 11
Descriptive statistics for PHQ scores by PMCEQ factor two and MCQ total.

		PMCEQ Factor 2		
		Low PMCEQF2 (*n*=63)	High PMCEQF2 (*n*=69)	Total (*n*=132)
MCQ Total	Low MCQ (*n*=62)	8.19 (5.28)	6.29 (5.34)	7.16 (5.36)
	High MCQ (*n*=70)	14.35 (6.96)	11.58 (6.86)	12.97 (6.99)
	Total (*n*=132)	11.22 (6.86)	8.67 (6.58)	

Kolmogorov-Smirnov tests were used to examine whether the data were normally distributed and found the data for low MCQ, D(62)= 0.15, p<0.05, low PMCEQF2, D(63)=0.12, p<0.05 and high PMCEQF2, D(69)=0.15, p<0.05 , to be not normally distributed. Data for high MCQ, D(70)=0.09, p=ns was normally distributed. Additionally, results of Levene's test of homogeneity of variance found the variance across the two MCQ total conditions, F(1,130)=6.46, <0.05 to be unequal. It was however, equal across the two PMCEQ factor 2 conditions, F(1,130)=0.01, p=ns. Therefore, again, the data did not meet the assumptions of parametric statistics.
A significant main effect was found for MCQ total, F(1,128)=28.79, p<0.05, η^2=0.18, post hoc power=1.00. A significant main effect was also found for PMCEQ factor 2, F(1,128)=4.79, p<0.05, η^2=0.04, post hoc power=0.58. As figure 2 shows there was a non-significant interaction, F(1,128)=0.17, p=ns, η^2=0.00, post hoc power=0.07.

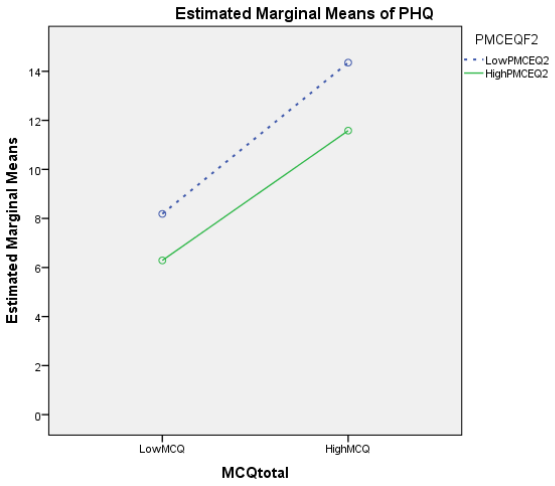

Figure 2: Interaction between MCQ total and PMCEQF2 factors for PHQ scores.

As table 12 shows participants with high MCQ total scores and low PMCEQ factor 3 scores had the highest depression scores. Participants with low MCQ total scores and high PMCEQ factor 3 scores had the lowest depression scores. In terms of PMCEQ factor 3 only, participants with low scores had the highest depression scores.

Table 12
Descriptive statistics for PHQ scores by PMCEQ factor three and MCQ total.

		PMCEQ Factor 3		
		Low PMCEQF3 (*n*=57)	High PMCEQF3 (*n*=75	Total (*n*=132)
MCQ Total	Low MCQ (*n*=62)	9.52 (5.61)	5.67 (4.67)	7.16 (5.36)
	High MCQ (*n*=70)	14.73 (6.41)	11.30 (7.21)	12.97 (6.99)
	Total (*n*=132)	12.26 (6.54)	8.08 (6.48)	

Kolmogorov-Smirnov tests were used to examine whether the data were normally distributed and found the data for low MCQ, D(62)= 0.15, p<0.05 and high PMCEQF3, D(75)=0.18, p<0.05 , to be not normally distributed. Data for high MCQ, D(70)=0.09, p=ns and low PMCEQF3, D(57)=0.11, p=ns, was normally distributed. Additionally, results of Levene's test of homogeneity of variance found the variance across the two MCQ total conditions, F(1,130)=6.46, <0.05 to be unequal. It was however, equal across the two PMCEQ factor 3 conditions, F(1,130)=0.02, p=ns. Therefore, again, the data did not meet the assumptions of parametric statistics.
A significant main effect was found for MCQ total, F(1,128)=26.61, p<0.05, η^2=0.17, post hoc power=0.99. A significant main effect was also found for PMCEQ factor 3, F(1,128)=11.92, p<0.05, η^2=0.09, post hoc power=0.93. As figure 3 shows there was a non-significant interaction, F(1,128)=0.04, p=ns, η^2=0.00, post hoc power=0.06.

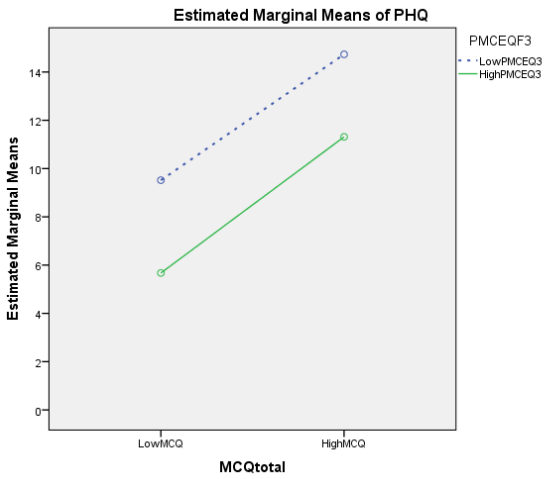

Figure 3: Interaction between MCQ total and PMCEQF3 factors for PHQ scores.

Post-Hoc ANOVAs for Anxiety

As table 13 shows participants with high MCQ total scores and low PMCEQ factor 1 scores had the highest anxiety scores. Participants with low MCQ total scores and high PMCEQ factor 1scores had the lowest anxiety scores. In terms of MCQ total only, participants with high MCQ scores had the highest levels of anxiety. In terms of PMCEQ factor 1 only, participants with low scores had the highest anxiety scores.

Table 13
Descriptive statistics for GAD scores by PMCEQ factor one and MCQ total.

		PMCEQ Factor 1		
		Low PMCEQF1 (*n*=55)	High PMCEQF1 (*n*=77)	Total (*n*=132)
MCQ Total	Low MCQ (*n*=62)	7.41 (4.35)	3.85 (3.61)	4.71 (4.07)
	High MCQ (*n*=70)	12.42 (5.61)	5.21 (4.52)	9.63 (6.27)
	Total (*n*=132)	10.87 (5.71)	4.27 (3.94)	

Kolmogorov-Smirnov tests were used to examine whether the data were normally distributed and found the data for low MCQ, D(62)= 0.12, p<0.05, high MCQ, D(70)=0.15, p<0.05, low PMCEQF1, D(55)=0.17, p<0.05 and high PMCEQF1, D(77)=0.14, p<0.05 , to be not normally distributed. Additionally, results of Levene's test of homogeneity of variance found the variance across the two MCQ total conditions, F(1,130)=19.11, <0.05 and across the two PMCEQF1 conditions, F(1,130)=16.00, p<0.05, to be unequal. Therefore, again, the data did not meet the assumptions of parametric statistics. However, with regards to homogeneity of variance, the largest standard deviation did not exceed the smallest by more than four times for both MCQ conditions (6.27/4.07=1.54) and both PMCEQ factor 1 conditions (5.71/3.94=1.45).

A significant main effect was found for MCQ total, F(1,128)=13.63, p<0.05, Ƞ²=0.09, post hoc power=0.96. A significant main effect was also found for PMCEQ factor 1, F(1,128)=39.03, p<0.05, Ƞ²=0.23, post hoc power=1. As figure 4 shows there was a significant interaction, F(1,128)=4.48, p<0.05, Ƞ²=0.03, post hoc power=0.56.

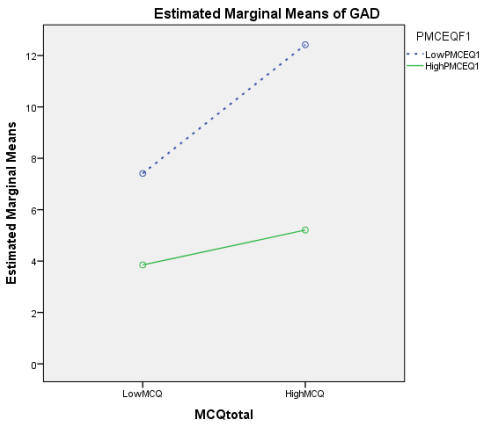

Figure 4: Interaction between MCQ total and PMCEQF1 factors for GAD scores

As table 14 shows participants with high MCQ total scores and low PMCEQ factor 2 scores had the highest anxiety scores. Participants with low MCQ total scores and high PMCEQ factor 2 scores had the lowest anxiety scores. In terms of PMCEQ factor 2 only, participants with low scores had the highest anxiety scores.

Table 14
Descriptive statistics for GAD scores by PMCEQ factor two and MCQ total

		PMCEQ Factor 2		
		Low PMCEQF2 (*n*=63)	High PMCEQF2 (*n*=69)	Total (*n*=132)
MCQ Total	Low MCQ (*n*=62)	6.06 (4.73)	3.58 (3.04)	4.71 (4.07)
	High MCQ (*n*=70)	11.87 (6.10)	7.39 (5.69)	9.63 (6.27)
	Total (*n*=132)	8.92 (6.15)	5.29 (4.79)	

Kolmogorov-Smirnov tests were used to examine whether the data were normally distributed and found the data for low MCQ, D(62)= 0.12, p<0.05, high MCQ, D(70)=0.15, p<0.05, low PMCEQF2, D(63)=0.16, p<0.05 and high PMCEQF2, D(69)=0.15, p<0.05 , to be not normally distributed. Additionally, results of Levene's test of homogeneity of variance found the variance across the two MCQ total conditions, F(1,130)=19.11, <0.05 and across the two PMCEQF2 conditions, F(1,130)=5.25, p<0.05, to be unequal. Therefore, again, the data did not meet the assumptions of parametric statistics. However, with regards to homogeneity of variance, the largest standard deviation did not exceed the smallest by more than four times for both MCQ conditions (6.27/4.07=1.54) and both PMCEQ factor 2 conditions (6.15/4.79=1.28).
A significant main effect was found for MCQ total, F(1,128)=13.04, p<0.05, Ƞ²=0.20, post hoc power=1.00. A significant main effect was also found for PMCEQ factor 2, F(1,128)=16.29, p<0.05, Ƞ²=0.11, post hoc power=0.98. As figure 5 shows there was a non-significant interaction , F(1,128)=1.34, p=ns, Ƞ²=0.10, post hoc power=0.21.

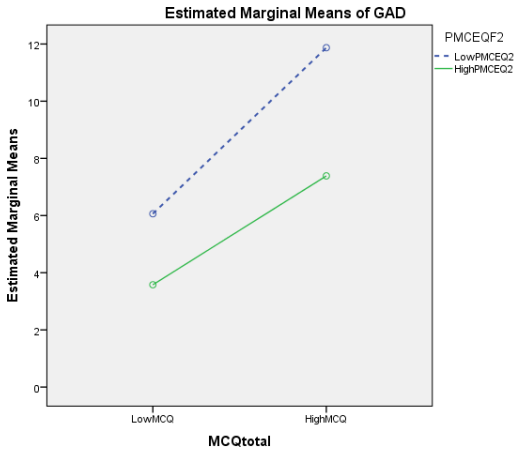

Figure 5: Interaction between MCQ total and PMCEQF2 factors for GAD scores

As table 14 shows participants with high MCQ total scores and low PMCEQ factor 2 scores had the highest anxiety scores. Participants with low MCQ total scores and high PMCEQ factor 2 scores had the lowest anxiety scores. In terms of PMCEQ factor 2 only, participants with low scores had the highest anxiety scores.

Table 15
Descriptive statistics for GAD scores by PMCEQ factor three and MCQ total.

		PMCEQ Factor 3		
		Low PMCEQF3 (*n*=57)	High PMCEQF3 (*n*=75)	Total (*n*=132)
MCQ Total	Low MCQ (*n*=62)	7.52 (4.36)	2.95 (2.68)	4.71 (4.07)
	High MCQ (*n*=70)	11.53 (5.62)	7.84 (6.41)	9.63 (6.27)
	Total (*n*=132)	9.63 (5.41)	5.04 (5.22)	

Kolmogorov-Smirnov tests were used to examine whether the data were normally distributed and found the data for low MCQ, D(62)= 0.12, p<0.05, high MCQ, D(70)=0.15, p<0.05, low PMCEQF3, D(57)=0.16, p<0.05 and high PMCEQF3, D(75)=0.18, p<0.05 , to be not normally distributed. Additionally, results of Levene's test of homogeneity of variance found the variance across the two MCQ total conditions, F(1,130)=19.11, <0.05 to be unequal. It was however, equal across the two PMCEQ factor 3 conditions, F(1,130)=1.10, p=ns. Therefore, again, the data did not meet the assumptions of parametric statistics.
A significant main effect was found for MCQ total, F(1,128)=27.22, p<0.05, Ƞ²=0.18, post hoc power=0.99. A significant main effect was also found for PMCEQ factor 3, F(1,128)=23.39, p<0.05, Ƞ²=0.15, post hoc power=0.99. As figure 6 shows there was a non-significant interaction, F(1,128)=6.14, p=ns, Ƞ²=0.00, post hoc power=0.08.

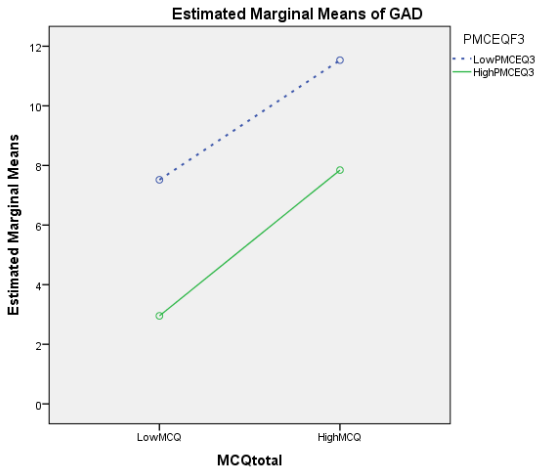

Figure 6: Interaction between MCQ total and PMCEQF3 factors for GAD scores

Discussion

It was hypothesised that MCQ factors would negatively predict life satisfaction and PMCEQ factors would positively predict life satisfaction. The results of the study indicate that life satisfaction can be negatively predicated by MCQ factor four, Beliefs about the Need to Control Thoughts and positively predicted by PMCEQ factor one, Confidence in Extinguishing Perseverative Thoughts and Emotions and PMCEQ factor three, Confidence in Setting Flexible and Feasible Hierarchies of Goals. The overall model accounted for 44.3% of the variance in life satisfaction. Consequently, the results lend some support to the hypothesis. Overall findings suggests lower level LS in individuals with Vasculitis compared to the general population, nonetheless, the range of scores indicates some participants had high LS. This demonstrates that positive outcomes can be experienced regardless of the significant psychological impact of living with a chronic illness.

PMCEQ factor three made the largest contribution to the prediction of LS, indicating that confidence in setting appropriate goals is important. This is consistent with progression from object to metacognitive mode and subsequent adaptive coping requiring the identification of hierarchical goals. Moreover, the findings support the proposal of Diener (2000) that goal flexibility is central to subjective well-being when facing difficult circumstances. In relation to chronic illness, it has been found that multiple proximal goals are more effective in assisting positive adaptation to chronic disability as opposed to fewer more distant goals (Kemp & Vash, as cited in Elliot et al., 2005). This suggests that greater LS is achieved in individuals who are able to successfully adapt to chronic illness by setting realistic, proximal and achievable goals.

The contribution of PMCEQ factor one to LS can be explained by the S-REF model (Wells & Matthews, 1994). Maladaptive coping strategies, such as rumination result from an attentional capacity limitation for external information due to excessive self-focus. Beer and Moneta (2010) report that while participants who successfully overcame challenges experienced an initial period of recurrent negative thinking, the cycle was subsequently interrupted and terminated. This inhibition of perseverative thoughts and emotions releases attention for other resources and allows adaptive coping strategies to be employed. In relation to the present study, an effective coping style may allow greater life satisfaction to be experienced due to a sense of mastery. Additionally, the cessation of negative thinking cycles may allow individuals to move forward and provide the opportunity for personal growth which is reflected in life satisfaction. Beer and Moneta (2010) also note that a high level of PMCEQ factor one results in persistence in the face of adversity and thus is important during long-term challenges. This is particularly relevant to chronic illness, as it is, by nature, a long-term challenge.

The predictive power of MCQ factor four, Beliefs about the Need to Control Thoughts, can also be explained by referring to the S-REF model. Individuals who believe negative thoughts should be inhibited are more likely to engage in perseverative thinking and constant monitoring in order to identify and suppress such thoughts. Cognitive bias for negative thoughts is also likely to occur, limiting attention for more positive experiences. Related concepts of experiential avoidance, which is

the reluctance to allow negative thoughts to be experienced and mindfulness, being aware and accepting of current thoughts in a non-judgemental way, have been found to predict psychological well-being (Mitmansgruber et al., 2009). In particular, experiential avoidance was found to negatively predict LS. The pertinence of this to living with a chronic illness where negative thoughts may occur on a frequent basis can explain the importance of this factor in predicting LS. The ability to allow negative thoughts to be experienced and accepted rather than seeking to control them may allow individuals to obtain higher levels of life satisfaction.

Anxiety and depression scores were found to be higher within this study than previously reported in patient and general populations. This is consistent with other Vasculitis studies (Haji-Ali et al., 2011; Kountantji et al., 2003) and psychological maladaptation to Vasculitis is a significant problem. Main effects were found for MCQ total scores and all three PMCEQ factors for both depression scores as measured by the PHQ-9 and anxiety scores as measured by GAD-7. Concordant with previous chronic illness research individuals with high MCQ total scores had significantly higher depression and anxiety scores (Allot et al., 2005). Additionally, individuals with low PMCEQ factor scores also had significantly higher depression and anxiety scores. There was a significant interaction between PMCEQ factor 1 and MCQ totals for anxiety scores only, all other interactions were non-significant. Spearman's Rho coefficients were largest for PMCEQ factor 1, demonstrating negative correlation with anxiety and depression, and lowest for MCQ factor 2 demonstrating positive correlation with these outcome variables. Although the hypotheses that MCQ scores would positively predict anxiety and depression and PMCEQ scores would negatively predict anxiety and depression could not be directly tested, these findings suggest that there is a relationship between these variables and in the direction hypothesised.

The high correlation between PMCEQ factor one and anxiety and depression suggests it is of importance in the prevention of psychological distress. Additionally, this PMCEQ factor was the only factor to significantly interact with MCQ total for anxiety. The highest correlation for this factor was with GAD, therefore it is possible this strong relationship between PMCEQ factor one and anxiety accounts for the interaction between MCQ total and PMCEQ factor. Due to the high correlation, the combined effect of these variables influences anxiety outcomes beyond the main effects of each variable separately.

The impact of PMCEQ factor one on depression and anxiety can be explained in a similar way to that of its impact upon the promotion of life satisfaction. Confidence in extinguishing perseverative thoughts assists prevention of re-cyclical thinking and therefore the utilisation of rumination as a coping strategy. Nolen-Hoeksema et al. (2008) highlight that rumination enhances negative thinking therefore intensifying and maintaining depression. Similarly, in relation to Generalised Anxiety Disorder, anxiety symptoms are enhanced by meta-worry, where worry is seen as uncontrollable, maintaining the belief that worrying is dangerous, therefore thoughts become cyclical and perseverative (Wells & Carter, 2001). Furthermore, Beer and Moneta (2011) report that PMCEQ factor one is negatively predictive of other maladaptive coping strategies such as denial and behavioural disengagement (e.g. withdrawal). In support of this, Burker et al. (2005) found denial to strongly predict depression in individuals with chronic heart disease. In addition, Rutter and Rutter

(2002) also found behavioural disengagement which reduces efforts to deal with the challenging situation to predict anxiety. In sum, these findings suggest that the mechanism through which this factor contributes to anxiety and depression is through prevention of maladaptive coping strategies, therefore reducing the likelihood of psychological distress.
Beer and Moneta (2010) highlight that it is possible that PMCEQ factor one is an inverse version of MCQ factor two, Negative Beliefs about Worry Concerning Uncontrollability and Danger. However, within this study MCQ factor two did not predict life satisfaction, had the lowest correlation coefficient with anxiety and did not significantly correlate with depression. Therefore, this suggests that PMCEQ factor one is distinct from MCQ factor two, measuring differing aspects of metacognition that the MCQ. This supports that positive metacognitions have an impact above and beyond maladaptive metacognitions in producing favourable psychological outcomes.

Overall, the relationships identified within this study advocates that both positive metacognitions and meta-emotions and maladaptive metacognitions impact significantly on adaptation to chronic illness in the form of both psychological distress and life satisfaction. The concept of mindfulness offers an understanding more broadly of the role of metacognitions in the adaptation outcomes. Bishop et al. (2004) conceptualise mindfulness as a process of regulation of attention and investigative awareness of the situation currently being experienced. Consistent with this, Beer and Moneta (2011) argue that mindfulness reflects the adaptive metacognitive mode within the S-REF model. Use of this metacognitive mode/mindfulness allows the physical symptoms and negative thoughts associated with chronic illness to be experienced. However, attention is subsequently directed away from these experiences towards daily goals, enhancing life satisfaction and reducing the likelihood of anxiety and depression.

Beer and Moneta (2011) suggest that within Lazarus and Folkman's (1986) transactional model of stress, a high level of PMCEQ factors ensure that difficult situations are interpreted as a challenge rather than a threat and therefore adaptive coping strategies are employed. However, while the transactional model does provide some explanation for the link between metacognitions and coping, Garland et al. (2009) points out it does not account for the experience of positive outcomes during unresolved stressful events. The transactional model suggests positive affect is a result of effective coping leading to the resolution of the challenging situation. However, chronic illness related stressors are often unresolved. A further mechanism through which positive outcomes such as life satisfaction can be achieved in the face of long-term challenges must be in operation.

In consideration of this, the self-regulatory model of illness cognitions (Leventhal et al., 1980) may better explain positive outcomes in chronic illness. The central tenet of this model is that an individual's cognitions about their illness affect interpretation of their diagnosis and symptom perception, which guide subsequent coping strategies. Positive illness representations are more likely to promote adaptive coping mechanisms, consequently enabling positive outcomes of illness to be experienced. Stanton and Revenson (2007) point out that within this model limiting the view of illness as being encompassed in certain aspects of the self, rather than as indistinguishable from the self, allows higher levels of adjustment due to lesser

impingement upon daily life functions and activities. In support of this, Evans and Norman (2009) found negative illness representations to predict anxiety and depression in individuals with Parkinson's disease. The self-regulatory model therefore, provides a more parsimonious explanation of the findings of this study, accounting for both positive and negative outcomes in the face of long-term stress.

There are some methodological limitations of this study to be considered. One such issue is the overrepresentation of females within the sample. It has been reported that more females than males consistently seek support and advice from peers both in face-to-face groups and in online forums (Krizek et al., 1999; Seale, 2006). Therefore, the biased sample is likely to be due to recruiting from charity websites and support group pages and consequently, is representative of Vasculitis support group users rather than the Vasculitis population as a whole. Furthermore, there is some evidence that females report more stress-related growth than males (Vishnevsky et al., 2010) accordingly, as life satisfaction is a related concept, it is possible levels reported in this sample are elevated. Therefore, in order to generalise the findings of this study further research is recommended both with a representative sample of the Vasculitis population and into the effect of gender on the relationship between metacognitions and successful adaptation to chronic illness.

Additionally, common to all self-report methodologies is the problem of response bias. Social desirability bias is particularly relevant in health-related studies due to either self-deception/denial or deliberately underreporting symptoms in order to appear 'healthy' (van de Mortel, 2008). Therefore, it is possible that there is variance between participants who were willing to report their levels of depression, anxiety and life satisfaction accurately and those who were influenced by social desirability.
Furthermore, there is the inherent problem of causality associated with regression and correlational analysis. It is possible that life satisfaction predicts the use of positive metacognitions rather than the opposite causal association. Similarly, the correlation between metacognitions and anxiety and depression does not suggest a direction of causation. Therefore, further experimental study is required to investigate the effect of training to increase the use positive metacognitions on both positive and negative adaptation outcomes, controlling for levels of these variables before the intervention. Additionally, 66% of the variance in LS was not accounted for by the regression model. This suggests other variables not measured may impact upon life satisfaction. Diener et al. (1999) highlight that personality traits such as extraversion and neuroticism and also dispositional optimism have been found to influence subjective well-being. Marriage has also been found to be a strong predictor of life satisfaction within patient populations (Arrindell et al., 1991).

It should also be noted that age correlated negatively with both anxiety and depression, while a positive relationship for prednisolone dosage and medication number was found for depression only. This shows some consistency with previous research (Carpenter et al., 2011; Faurschou et al., 2010; Warrington & Bostwick, 2006). Due to constraints of the analysis process, the relationship of these variables with anxiety and depression were not examined using ANOVA. Consequently, it should be recognised that this limits understanding of the contributors to maladaptation within the present study, however, there is opportunity for further examining these variables in future. Further to this, other moderators have previously been identified within the process of maladaptation to chronic disease. For example,

Carpenter et al. (2011) found medication-related social support from an individual's physician and also partner to impact on mental health related quality of life in individuals with Vasculitis. Furthermore, while categorical disease status data was collected within the present study, the Birmingham Vasculitis Activity Score (BVAS) has been utilised in other research to allow an objective score of disease status to be obtained from an individual's physician. A numerical score would allow the predictive power of this variable to be more easily assessed. Abularrage et al. (2008) found remission status to predict mental health quality of life, therefore highlighting its importance in psychological outcomes. In future, researchers should seek to control for these variables in order to obtain a more accurate understanding of the relationship between metacognitions and adaptation to chronic illness.

An additional direction for further research is to assess the relationship between metacognitions and adaptation to Vasculitis over the long-term. A longitudinal investigation would allow changes as the illness fluctuates in disease status to be examined. Stanton and Revenson (2007) argue that adaptation is a dynamic process affected by life context. Therefore, the requirements to successfully adapt change as treatment, prognosis and level of disability alter. Moreover, the effect on social relationships may change due to episodes of worsening health when individuals may be more dependent on others. An insight into the use of adaptive metacognitions to promote successful adaptation in relation to disease status, will allow an understanding of the most effective interventions relevant to the stage of illness.

To expand on the practical applications of this research, there are several ways in which therapy or coaching may be applied in order to support positive outcomes of chronic illness. Firstly, derived from the S-REF model, Metacognitive Therapy (MCT, Wells, 1997) aims to reduce CAS and change maladaptive metacognitive beliefs. While traditional Cognitive Behavioural Therapy (CBT) focuses on the content of maladaptive beliefs, MCT targets the metacognitive processes that contribute to the perseveration of negative emotion. Attention training and 'detached mindfulness' assist individuals to decrease self-focus, disengage from dysfunctional coping strategies and shift from object mode of processing to metacognitive mode (Wells, 1997). MCT has been found to be effective both in anxiety and depression (Wells & King, 2006; Wells et al., 2012).

Secondly, due to the importance of positive metacognitions of confidence in setting flexible goals and also in inhibiting perseverative found within this study, MCT therapy could be expanded to included interventions to additionally promoting these factors. As previously discussed mindfulness appears to be a concept closely related to adaptive metacognitive functioning, therefore techniques such as Mindfulness Based Stress Reduction (MBSR, Kabat-Zinn et al., 1982) may be a practical way in which maladaptive metacognitions are reduced and adaptive metacognitions increased simultaneously. Consistent with positive psychology, mindfulness therapy is said to promote positive adaptation rather than to assume psychopathology is present and requires treatment (Hamilton et al, 2006). MBSR has been found to be effective in reducing psychological distress and promoting well-being in a range of chronic conditions (Grossman et al., 2004).

In conclusion, the present study provides supporting evidence for a relationship between both positive and maladaptive cognitions and depression, anxiety and life

satisfaction. Further to this, a presence of positive metacognitive factors one and three, appear to be conducive to successful adaptation beyond an absence of maladaptive metacognitions. Therefore, development of the well-established S-REF model to additionally include the concepts of positive metacognitions and meta-emotions is indicated. By taking a positive psychology stance of seeking to understand successful functioning in addition to maladaptation allows insight into not only how psychological distress can be prevented in Vasculitis but also how benefits such as positive growth and life satisfaction can be achieved. A suggested mechanism for these findings is that adaptive metacognitions allow positive representations of the illness, subsequently allowing successful coping processes to be employed. Further research into the processes involved in metacognition, coping and outcomes are required in order that this can be confirmed.

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