PHYSICAL DISABILITY AND PSYCHOLOGICAL DISTRESS IN MULTIPLE SCLEROSIS: THE ROLE OF ILLNESS REPRESENTATIONS AND EXPERIENTIAL AVOIDANCE.

by

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Objectives: This study explores factors associated with psychological wellbeing and distress in people with Multiple Sclerosis (MS). The role of physical symptoms, illness representations and experiential avoidance in predicting psychological distress was assessed.

Design: Cross-sectional data was collected from 121 participants with a diagnosis of MS. Path analysis was used to test a hypothetical model of distress in MS that hypothesised that experiential avoidance would mediate the relationships between level of symptoms and distress, and between illness representations and distress.

Methods: Participants completed questionnaires assessing level of physical symptoms (EDSS), illness representations (BIPQ), experiential avoidance (AAQ-II), and psychological distress (GHQ-30). Path coefficients, allowing direct and indirect relationships to be evaluated, were obtained from a series of simultaneous multiple regression analyses; one for each endogenous variable (experiential avoidance, distress).

Results: Participants results highlighted significant positive associations between all the variables (symptoms, illness representations, experiential avoidance) and distress. Path analysis revealed that experiential avoidance did not mediate the relationships between level of symptoms and distress, nor illness representations and distress. Illness representations were the strongest predictor of psychological distress, while experiential avoidance was the strongest predictor when distress was conceptualised as depression.

Conclusions: Overall the study did not suggest that experiential avoidance mediates the relationship between illness representations and psychological distress; instead illness representations alone accounted for most of the variance in psychological distress. Experiential avoidance accounted for most of the depression experienced by participants. These results have a direct impact on how psychological interventions are delivered for people with MS, suggesting that disease factors, and beliefs about the illness, need to be taken account of and incorporated into treatment for presenting problems.
# TABLE OF CONTENTS

## Chapter One: Introduction

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Thesis Overview</td>
<td>1</td>
</tr>
<tr>
<td>1.2 Introduction to the Study</td>
<td>1</td>
</tr>
<tr>
<td>1.3 The Concept of Experiential Avoidance</td>
<td>3</td>
</tr>
<tr>
<td>1.3.1 Overview</td>
<td>3</td>
</tr>
<tr>
<td>1.3.2 Definition of Experiential Avoidance</td>
<td>3</td>
</tr>
<tr>
<td>1.3.3 Acceptance and Commitment Therapy</td>
<td>4</td>
</tr>
<tr>
<td>1.4 Multiple Sclerosis</td>
<td>5</td>
</tr>
<tr>
<td>1.4.1 Definition of Multiple Sclerosis</td>
<td>6</td>
</tr>
<tr>
<td>1.4.2 Epidemiology</td>
<td>6</td>
</tr>
<tr>
<td>1.4.3 Types and Stages of Multiple Sclerosis</td>
<td>7</td>
</tr>
<tr>
<td>1.4.4 Symptoms of Multiple Sclerosis</td>
<td>8</td>
</tr>
<tr>
<td>1.5 Multiple Sclerosis, Psychiatric Co-Morbidity and Psychological Wellbeing</td>
<td>9</td>
</tr>
<tr>
<td>1.5.1 Causes Of Psychological Distress In Multiple Sclerosis</td>
<td>10</td>
</tr>
<tr>
<td>1.5.1.1 Physical Disability</td>
<td>10</td>
</tr>
<tr>
<td>1.5.1.2 Pain, Fatigue and Cognitive Impairment</td>
<td>11</td>
</tr>
<tr>
<td>1.5.1.3 Coping Stress and Social Support</td>
<td>12</td>
</tr>
<tr>
<td>1.6 Illness Representations and Multiple Sclerosis</td>
<td>13</td>
</tr>
<tr>
<td>1.7 Experiential Avoidance and Distress: The Evidence</td>
<td>15</td>
</tr>
<tr>
<td>1.7.1 Aims and Scope of the Current Literature</td>
<td>16</td>
</tr>
<tr>
<td>1.7.2 Systematic Review Question</td>
<td>16</td>
</tr>
<tr>
<td>1.7.3 Method:</td>
<td>16</td>
</tr>
<tr>
<td>1.7.3.1 Literature Search Strategy</td>
<td>16</td>
</tr>
<tr>
<td>1.7.3.2 Search Terms</td>
<td>16</td>
</tr>
<tr>
<td>1.7.3.3 Inclusion and Exclusion Criteria</td>
<td>16</td>
</tr>
<tr>
<td>1.7.3.4 Inclusion Criteria</td>
<td>17</td>
</tr>
<tr>
<td>1.7.3.5 Exclusion Criteria</td>
<td>17</td>
</tr>
<tr>
<td>1.7.4 Systematic Review Process</td>
<td>17</td>
</tr>
<tr>
<td>1.7.5 Results</td>
<td>18</td>
</tr>
<tr>
<td>Section</td>
<td>Page</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>1.7.5.1 Overview of the Narrative Literature</td>
<td>18</td>
</tr>
<tr>
<td>1.7.5.2 Study Design</td>
<td>18</td>
</tr>
<tr>
<td>1.7.5.3 Aims Of The Studies</td>
<td>18</td>
</tr>
<tr>
<td>1.7.5.4 Samples Included In the Studies</td>
<td>19</td>
</tr>
<tr>
<td>1.7.5.5 The Measurement of Experiential Avoidance</td>
<td>20</td>
</tr>
<tr>
<td>1.7.6 The Relationship between Experiential Avoidance and Psychopathology</td>
<td>21</td>
</tr>
<tr>
<td>1.7.6.1 Depression</td>
<td>21</td>
</tr>
<tr>
<td>1.7.6.2 Anxiety</td>
<td>21</td>
</tr>
<tr>
<td>1.7.6.3 Psychological Wellbeing /Stress / Psychiatric Severity</td>
<td>21</td>
</tr>
<tr>
<td>1.7.6.4 Delusions/Paranoia</td>
<td>22</td>
</tr>
<tr>
<td>1.7.6.5 Post Traumatic Stress Disorder</td>
<td>22</td>
</tr>
<tr>
<td>1.7.6.6 Borderline Personality Disorder</td>
<td>22</td>
</tr>
<tr>
<td>1.7.6.7 Obsessive Compulsive Disorder</td>
<td>22</td>
</tr>
<tr>
<td>1.7.6.8 Summary</td>
<td>22</td>
</tr>
<tr>
<td>1.7.7 Experiential Avoidance as a Mediator</td>
<td>23</td>
</tr>
<tr>
<td>1.7.7.1 Baron and Kenny Method of Moderation</td>
<td>23</td>
</tr>
<tr>
<td>1.7.7.2 Baron and Kenny Method of Mediation:</td>
<td>24</td>
</tr>
<tr>
<td>1.7.7.3 Preacher and Hayes Bootstrapping Method Of Mediation</td>
<td>25</td>
</tr>
<tr>
<td>1.7.8 The Predictive Value of Experiential Avoidance</td>
<td>26</td>
</tr>
<tr>
<td>1.7.9 Summary</td>
<td>27</td>
</tr>
<tr>
<td>1.7.10 Critical Review and Discussion</td>
<td>28</td>
</tr>
<tr>
<td>1.7.10.1 Samples</td>
<td>28</td>
</tr>
<tr>
<td>1.7.10.2 Methods</td>
<td>29</td>
</tr>
<tr>
<td>1.7.10.3 Measures</td>
<td>30</td>
</tr>
<tr>
<td>1.7.10.4 Theoretical Issues</td>
<td>31</td>
</tr>
<tr>
<td>1.7.10.5 Summary</td>
<td>32</td>
</tr>
<tr>
<td>1.8 Chapter Summary</td>
<td>32</td>
</tr>
<tr>
<td>1.9 Introduction to the Current Study</td>
<td>34</td>
</tr>
<tr>
<td>1.9.1 Aim</td>
<td>34</td>
</tr>
</tbody>
</table>
# Table of Contents

1.9.2 Research Question 34  
1.9.3 Path Analysis Approach 34  
1.9.4 Hypothesised Path Model 35  
1.9.5 Purpose of Study 36  

## Chapter Two: Methods 37  
2.1 Introduction 37  
2.2 Design 37  
2.3 Power Analysis 38  
2.4 Sample 38  
  2.4.1 Inclusion Criteria 38  
2.5 Measures 39  
  2.5.1 Demographic Questionnaire 40  
  2.5.2 The Expanded Disability Status Scale (EDSS): Self Report 40  
  2.5.3 The Acceptance and Action Questionnaire-II 41  
  2.5.4 The Brief Illness Perception Questionnaire 42  
  2.5.5 The General Health Questionnaire 30 42  
2.6 Procedure 43  
  2.6.1 Recruitment 43  
2.7 Ethical Considerations 44  
2.8 Ethical Approval 45  

## Chapter Three: Results: 47  
3.1 Introduction 47  
3.2 Descriptive Data 47  
  3.2.1 Participants 47  
  3.2.2 Measures 48  
3.3: Statistical Analysis 50  
3.4 Data Screening: 50  
  3.4.1 Missing Data Imputation 50
3.4.2 Outliers

3.5: Tests of Multivariate Assumptions
3.5.1 Normality
3.5.2 Data Transformation
3.5.3 Multicollinearity
3.5.4 Independent Errors
3.5.5 Linearity and Homoscedacity
3.5.6 Summary

3.6 Bivariate Correlations

3.7 Path Analysis
3.7.2 Success of the Psychological Distress Path Model

3.8 Psychological Distress Conceptualised As Depression

Chapter Four: Discussion:

4.1 Overview

4.2 Summary and Interpretation of the Findings
4.2.1 The Psychological Distress Model
4.2.2 Distress Conceptualised As Depression

4.3 Strengths and Limitations of This Research
4.3.1 Strengths
4.3.2 Limitations
4.3.2.1 Design
4.3.2.2 Use of Self Report Measures
4.3.2.3 Measures Used
4.3.2.4 Sample

4.4 Clinical Implications

4.5 Service Implications

4.6 Future Research

4.7 Conclusion

References:
LIST OF FIGURES:

Figure 1.1: Hypothesised model of psychological distress 35
Figure 3.1: Path diagram of the relationships between level of symptoms, illness beliefs, experiential avoidance, and psychological distress showing path coefficients and error terms 58
Figure 3.2: Path diagram of the relationship between level of symptoms, illness beliefs, experiential avoidance, and depression showing path coefficients and error terms 62

LIST OF TABLES:

Table 3.1: Characteristics of participants in the study 48
Table 3.2: Descriptive data for EDSS, AAQ-II, BIPQ and GHQ-30 49
Table 3.3: Mean, median and mode for each of the items on the BIPQ 49
Table 3.4: Correlation matrix of variables EDSS, BIPQ, AAQ-II, GHQ-30 and the depression subscale from the GHQ-30. 55
## LIST OF APPENDICES:

<table>
<thead>
<tr>
<th>Appendix</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendix 1</td>
<td>Systematic review process</td>
<td>103</td>
</tr>
<tr>
<td>Appendix 2</td>
<td>The Strobe checklist</td>
<td>104</td>
</tr>
<tr>
<td>Appendix 3</td>
<td>Studies included in systematic review</td>
<td>106</td>
</tr>
<tr>
<td>Appendix 4</td>
<td>Background Information Questionnaire</td>
<td>117</td>
</tr>
<tr>
<td>Appendix 5</td>
<td>Expanded Disability Status Scale-self report</td>
<td>118</td>
</tr>
<tr>
<td>Appendix 6</td>
<td>Acceptance and Action Questionnaire-II</td>
<td>120</td>
</tr>
<tr>
<td>Appendix 7</td>
<td>The Brief Illness Perception Questionnaire</td>
<td>121</td>
</tr>
<tr>
<td>Appendix 8</td>
<td>The General Health Questionnaire (GHQ-30)</td>
<td>122</td>
</tr>
<tr>
<td>Appendix 9</td>
<td>Factor structure of the general health questionnaire</td>
<td>124</td>
</tr>
<tr>
<td>Appendix 10</td>
<td>Invitation letter</td>
<td>125</td>
</tr>
<tr>
<td>Appendix 11</td>
<td>Information sheet</td>
<td>126</td>
</tr>
<tr>
<td>Appendix 12</td>
<td>Consent form</td>
<td>130</td>
</tr>
<tr>
<td>Appendix 13</td>
<td>R&amp;D approval</td>
<td>132</td>
</tr>
<tr>
<td>Appendix 14</td>
<td>R&amp;D approval</td>
<td>134</td>
</tr>
<tr>
<td>Appendix 15</td>
<td>Ethical approval</td>
<td>136</td>
</tr>
<tr>
<td>Appendix 16</td>
<td>K-S statistics and histograms</td>
<td>140</td>
</tr>
<tr>
<td>Appendix 17</td>
<td>Skewness and kurtosis</td>
<td>143</td>
</tr>
<tr>
<td>Appendix 18</td>
<td>1st simultaneous multiple regression</td>
<td>144</td>
</tr>
<tr>
<td>Appendix 19</td>
<td>2nd regression</td>
<td>150</td>
</tr>
<tr>
<td>Appendix 20</td>
<td>Regression for depression model</td>
<td>156</td>
</tr>
<tr>
<td>Appendix 21</td>
<td>Post hoc-analysis</td>
<td>161</td>
</tr>
</tbody>
</table>
CHAPTER ONE: INTRODUCTION

1.1 THESIS OVERVIEW

Chapter One introduces key aspects of the research project. It will start by exploring the concept of experiential avoidance (EA). Before reviewing the relationship between EA and psychological distress by means of a systematic review, Multiple Sclerosis (MS) will be outlined. The chapter will also introduce the concept of illness representations, and the evidence to date of its relationship to psychological distress in MS. The chapter finishes by outlining the aims and objectives of this research including the research question, and clearly outlines the hypothesised path model indicating the proposed relationships between the variables in this study. The Methods chapter, Chapter Two, will introduce the procedures used to complete the research including what measures were used and how the sample was recruited. It will also provide a more in-depth account of path analysis. In Chapter three, the results are presented using path diagrams to consider the relationship between physical disability, illness representations, and EA and psychological distress in people with MS. Finally, Chapter Four, the discussion, concludes with a critical evaluation; as the implications of the results are considered. In this chapter the results are discussed in relation to the existing literature, clinical practice, future research and limitations of the current research.

1.2 INTRODUCTION TO THE STUDY

This research will explore factors that impact on psychological distress in people with MS. In particular the research will explore whether the construct of EA is useful when considering what mediates psychological distress in people with MS. EA has been explored within recent years as a potential mechanism that explains why distress occurs, and why psychological interventions that target EA lead to a decrease in psychological distress. The construct of EA is conceptualised as an unwillingness to remain in contact with private experiences such as painful thoughts and emotions and is often proposed to be critical to the development and maintenance of psychopathology (Hayes et al., 1996).

Empirical evidence illustrates that EA is associated with decreased quality of life across both clinical and non-clinical populations, that it moderates the impact of treatment and
other external events, and that it mediates the impact of stressful life events on a variety of psychological variables including coping styles and emotion regulation strategies (Boulanger et al., 2009). A meta-analysis by Hayes et al. (2006) showed that EA, as measured by the Acceptance and Action Questionnaire (AAQ-I, Hayes et al., 2004), accounted for 16-28% of the variance in a range of behavioural health problems (Boulanage et al., 2009). In a systematic review of the evidence for EA as a functional dimension in psychopathology Chawala and Ostafin (2007) highlighted that there is good evidence that EA predicts severity of symptoms in some psychiatric disorders and mediates the relationships between maladaptive coping and self regulatory strategies and psychological distress.

In light of the vast quantities of research emerging in the last ten years (e.g. that has explored EA and its association with psychopathology and maladaptive behaviours), updated research is necessary to help determine the relevance and applicability of this construct to different populations and psychological conditions. While EA has been studied in some clinical health populations (pain: Feldner et al., 2006, Zettle et al., 2005, HIV: Batten et al., 1997) it has not been applied to the MS population.

MS is the most common neurological disease of young adults and implies multiple psychosocial challenges including uncertainty, lack of control, interpersonal difficulties, stigma, visibility of disease and disability. Chronically ill individuals must strive to regain a feeling of normalcy, develop and maintain a positive self-image, control their physical symptoms, and make adjustments to their life roles (Minden & Schiffer, 1990). The amount of stress associated with making these adjustments is argued by Jean et al. (1997) to be directly related to the number and severity of disease related symptoms present, interference with work, social, and family environments, the availability and utilization of support systems and the patient’s personal assessment of the disease.

Past research has indicated a positive association between the level of disability and psychological distress (e.g. depression) for people with MS, however this finding has not always been upheld in the literature, with equal numbers of studies finding this association, and others not (Arnett et al., 2008). This would suggest the presence of moderators and mediators, for example, use of coping strategies, social support, and perceptions of the illness itself (ibid).
This study is concerned with whether the level of disability explains the levels of psychological distress people with MS experience, or whether this relationship is mediated by illness representations and/or EA.

1.3 THE CONCEPT OF EXPERIENTIAL AVOIDANCE

1.3.1 OVERVIEW

Providing an introduction to EA, the following section provides definitions of, and the theoretical underpinnings of EA.

1.3.2 DEFINITION OF EXPERIENTIAL AVOIDANCE

The idea that avoiding negative affect influences psychological distress is as old as the various schools of psychotherapy (Chawla & Ostafin, 2007). This idea, Chawala and Ostafin (2007) state, has recently been presented in a new way, as the construct of EA. Hayes et al. (1996) define EA as consisting of two analogous parts: the unwillingness to remain in contact with aversive private events (including bodily sensations, emotions, thoughts, memories, and behavioural predispositions), and secondly, the action taken to alter the aversive experiences or the events that elicit them.

Historically, EA has been incorporated by many psychological research fields, but in recent years, third wave cognitive and behavioural therapies have put EA as one of the main underlying tenets of their psychological model of mental health and wellbeing, such as dialectical behaviour therapy (DBT; Linehan, 1993), and Acceptance and Commitment Therapy (ACT; Hayes et al., 1999). While other therapies have long held the view that avoidance may lead to distress, ACT has been the first therapy that held EA as the central tenant that underpins psychological wellbeing, and more importantly that started to measure it.
1.3.3 ACCEPTANCE AND COMMITMENT THERAPY

ACT is an empirically supported treatment that combines acceptance and mindfulness strategies, and commitment and behaviour change strategies, with an emphasis on increasing psychological flexibility (Strosahl & Robinson, 2009). ACT has been evaluated in over 30 randomised clinical trials, and demonstrates a medium effect size (Cohen’s $d$ of around 0.6) in comparison to other active treatments known to be helpful for various psychological difficulties or disorders (Strosahl & Robinson, 2009). Research suggests that ACT is an effective intervention for depression, addictions, anxiety, smoking cessation, chronic pain, psychosis, diabetes management and job stress (Hayes et al., 2006). Meditational analyses have provided evidence for the possible causal role of core ACT processes (acceptance/EA, defusion and values) in producing beneficial clinical outcomes, while deficit levels of these core processes have been shown to correlate with psychopathology (Strosahl & Robinson, 2009).

ACT assumes that all distress is partially uncontrollable. Human beings are “hard-wired” so that anxiety and fear are essential in evolutionary terms, and as such it is unlikely that human beings could ever be free of these emotions (Gauntlett-Gilbert & Connell, 2012). From an ACT perspective, psychological suffering is caused by EA and an over-identification with the content of private experience, both of which it is argued, act as barriers to acting in ways that promote living a life that has purpose and meaning (Strosahl & Robinson, 2009). ACT also states that psychological distress predominately emerges from normal rather than pathological processes (Hayes et al., 2012), and distress originates not from biomedical or psychiatric syndromes, but rather from culturally supported attempts to escape from or avoid the experience of pain per se (Strosahl & Robinson, 2009). It is the attempt to avoid, escape and control unwanted private experiences that traps people in the cycle of human suffering (ibid).

When ACT was originally conceived, the overarching term for its model of psychological ill-health was EA; acceptance was the term used to positively describe this model and was defined as the willingness to experience unwanted private events in order to pursue one’s values and goals (Bond et al., 2011). Over the last few years the underlying model of ACT has emphasised psychological flexibility rather than EA, and the underlying model of ACT is increasingly referred to as psychological flexibility; defined as the ability to fully contact the present moment and the thoughts and feelings it contains without needless defense,
and depending upon the context, persisting in or changing behaviour in pursuit of goals and values (Hayes et al., 2006).

Contributing to levels of psychological flexibility are six inter-connected processes: contact with the present moment, acceptance, values, defusion, committed action, and self as context (Thompson & McCracken, 2011). All six processes are considered to interrelate and interact (Strosahl & Robinson, 2009); all combine to promote psychological flexibility (Hayes et al., 2006). EA is an example of psychological flexibility/inflexibility, and refers to psychological stances and actions that people take when the present moment contains thoughts and feelings that people may not wish to contact (Bond et al., 2011). ACT consequently views and operationalises EA and acceptance as two endpoints on a single continuum (Hayes et al., 2006), whereby the amount of time and energy deliberately spent employing EA strategies is suggested to diminish contact with present experiences and interfere with progress towards valued goals. Psychological acceptance, conversely, is based on flexible and efficient response styles that enable individuals to stay in contact with their thoughts and emotions whilst attending to the information they provide (Kashdan et al., 2009).

1.4 MULTIPLE SCLEROSIS

Before considering the evidence to support examining EA within the MS population, the following sections introduce MS including a definition of MS, epidemiology, types and stages of MS, and the symptoms of MS. This section then explores the links between MS and the high prevalence rates of psychological distress in this population. Although MS has many psychological and psychiatric consequences and co-morbidities, such as stress, anxiety, depression, and psychosis (Haussleiter et al., 2009); depression has been the most researched form of distress in the MS population, as it is the most common psychiatric diagnosis for this client group (Uguz et al., 2007). As such the focus of the following section focuses largely on depression. This section also highlights what has been proposed to cause distress in MS, and argues that EA and, illness representations, are worthy of further investigation within this clinical population.
1.4.1 DEFINITION OF MULTIPLE SCLEROSIS

MS literally means multiple scars (Eeltink & Duffy, 2004). MS is a chronic, often disabling, autoimmune disease that affects the central nervous system (CNS), including the brain, spinal cord and optic nerves (Kalb, 2008). In MS, the autoimmune attack involves inflammation directed against the myelin, which is the protective insulation surrounding the axons, and the cells that make myelin, in a process called demyelination (ibid). Demyelination results in plaques (often called lesions) along the myelin sheath that interferes with nerve conduction. When the myelin is damaged, neurological messages may either slowed down or be completely blocked, which can lead to a reduction or loss of functioning (Arnett, 2003). Because these lesions can form anywhere in the CNS, MS can produce a wide variety of symptoms (Mohr et al., 1999).

The course of MS is uncertain, but is a deteriorating condition marked by periodic attacks or exacerbations that remit partially or fully (Mohr et al., 1999). The overall prognosis of MS is well documented, with irreversible limitations in ambulation, a unilateral aid required for walking, and patients becoming wheelchair bound after approximately 8, 20, and 30 years of evaluation, respectively (Confavreux et al., 2003).

1.4.2 EPIDEMIOLOGY

Although MS appears most commonly in young adulthood, it has been known to develop in early childhood or long after age 60 (Kalb, 2008). With onset occurring during young adulthood, MS often strikes individuals who have not previously dealt with significant health concerns. According to the World Health Organization, MS affects more than 1.3 million people worldwide (Dua & Romani, 2008), and is the most common disease of the central nervous system to cause permanent disability in young adults (Ramagopalan et al., 2010).

MS is two times more common in people of Caucasian ethnicity than other ethnicities (McNulty, 2007). The proportion of women with MS is increasing, with a ratio of 3:1, women to men (Fowler et al., 2008) and there are thought to be approximately 85,000 people with the disease in the UK (Vaughan et al., 2003).
The precise factors that contribute to the development of MS are unknown, but it is generally believed that it is caused by environmental factors in a genetically susceptible person that trigger an autoimmune response against the CNS (Weiner, 2009). Factors supporting genetic effects include excess occurrence in Northern Europeans relative to indigenous populations from the same geographic location, familial aggregation, and lack of excess of MS in adopted relatives of patients with MS (Kantarci & Wingerchuk, 2006). The environmental epidemiology of MS is poorly understood but research implicates factors such as viral exposure, dietary fatty acids, vitamin D, solar ultraviolet radiation exposure, organic solvent exposure, and cigarette smoking (ibid).

1.4.3 TYPES AND STAGES OF MULTIPLE SCLEROSIS

There are four commonly accepted clinical courses that MS tends to take: benign MS, relapsing remitting MS (RRMS), primary progressive MS (PPMS) and secondary progressive MS (SPMS). Most patients are diagnosed with RRMS, which commonly develops into SPMS, while benign and PPMS are less commonly seen in the clinical population, as outlined below.

The first clinical course of MS is a benign sensory form, where attacks are characterised by sensory symptoms and/or inflammation of the optic nerve (optic neuritis). Benign MS is identified by disease duration, but also by level of disability (National Multiple Sclerosis Society (NMSS), 2011). Disability is commonly measured using the Expanded Disability Status Scale (EDSS; Kurtzke, 1983), and a low EDSS score coupled with lengthy disease duration has become synonymous with benign MS (Hviid et al., 2011). Benign MS patients have a mild course of disease and show no or minimal accumulation of disability over time, although little is known about patient reported outcomes such as quality of life, fatigue, depression and cognitive function (ibid).

RRMS is the most common form of the disease (Bramow et al., 2010), characterised by clearly defined acute attacks with full recovery or with residual deficit upon recovery (Arnett, 2003). Approximately 85% of people with MS begin with a RRMS course (NMSS, 2011), but the vast majority develop SPMS over time, characterised by gradual accumulation of irreversible impairment (Bramow et al., 2010).
SPMS begins initially as RRMS, followed by progression of disability. It is characterised by less functional recovery following attacks, persistently worsening functioning during or between attacks, and/or fewer and fewer attacks accompanied by progressive disability (NMSS, 2011). According to some studies more than 50% of people with RRMS will develop SPMS within ten years (ibid).

PPMS is characterised by progression of disability from onset and the symptoms generally do not subside or plateau (Arnett, 2003). Of people with MS, only 10% have PPMS (NMSS, 2011). People with PPMS steadily lose function over time, without experiencing remission from symptoms (Thompson et al., 1991). People with PPMS report higher perceived MS severity, more mental health problems and lower physical functioning than those with RRMS (Lerdal et al., 2009). Although patients with PPMS typically have a later disease onset and a more equal male: female ratio, they reach major disability milestones at similar ages as patients with SPMS (Bramow et al., 2010). By contrast, several studies indicate that patients with PPMS remain cognitively better preserved than those with SPMS (ibid).

1.4.4 SYMPTOMS OF MULTIPLE SCLEROSIS

There are many symptoms of MS that occur, some more debilitating than others and can include problems with urinary and bowel function, pain and changes in sensation and dizziness, tiredness, depression and cognitive or memory impairment, mobility, speech and eating difficulties, problems with eyesight and hearing (Robinson et al., 2000). More than 50% of MS patients experience problems with memory, executive functioning, attention, or speed of information processing (Bruce et al., 2010).

However, one of the characteristics of MS is the variability of symptoms that result from the many different parts of the CNS affected (Bruce et al., 2010). Rao et al., (1992) have suggested that because the etiology of MS remains largely unknown, there exists no cure for the disease and limited symptomatic relief. The question of whether there is a prodrome in MS has so far not been extensively studied (Ramagopalan et al., 2010), but many people who are diagnosed with MS recall earlier symptoms that could be attributable to a demyelinating event (ibid).
Although MS is a progressive neurological disease, patient’s experience of their disease extends beyond neurological disability to many other aspects of suffering, notably symptoms of fatigue, depression or pain (Ziemssen, 2009). As such Mitchell et al. (2005) argue that traditional medical models of impairment and disability are an incomplete summary of disease burden (Mitchell et al., 2005). For instance, in a study of quality of life in MS, physicians considered physical functioning and role limitations due to physical problems as the most important dimensions impacting on patient’s quality of life; however patients identified the mental health and role limitations due to emotional problems as the most important dimensions limiting their quality of life (Rothwell et al., 1997).

1.5 MULTIPLE SCLEROSIS, PSYCHIATRIC CO-MORBIDITY AND PSYCHOLOGICAL WELLBEING

Since the majority of MS patients are diagnosed between the ages of 20 and 40, they are often dealing with multiple issues: including raising a family, or starting their career (Dupont, 1997). Given its often unpredictable and progressive nature, widespread symptoms and neurological basis, Dyer and Ehde (2012) state that it is perhaps unsurprising that depression is a common co-morbid condition. Depression associated with MS is described by Gay et al. (2010) as usually moderate in severity, affecting between 15 to 47% of the MS population, with lifetime prevalence estimates of around 50%. Depressive symptoms emerge early in the course of MS, with scores on the Beck Depression Inventory (BDI, Beck, 1961) being over four times higher in patients with a mean disease duration of 17 months compared to age and gender matched controls (Kern et al., 2009, Sadovnik et al., 1996). Even though medium levels of intensity characterise this depression, the risk of suicide is 5-10 times higher in the MS population than in the general population (Gay et al., 2010, Sadovnik et al., 1996).

Other psychiatric symptoms such as anxiety, social anxiety (Poder et al., 2009) or irritability/emotional lability, are also common but have attracted far less attention when compared with depressive symptoms (Kern et al., 2009). Apart from clinical psychiatric diagnosis, sub-threshold psychiatric symptoms and psychological distress are also frequently present. In a study of 100 MS outpatients, 48% reported symptoms of emotional difficulties without meeting the criteria for a diagnostic disorder (Feinstein & Feinstein, 2001). Approximately 35% of patients endorse chronic worry (Bruce & Arnett, 2009). Personality changes, including decreased empathy, increased neuroticism, decreased
agreeableness and conscientiousness have also been noted in the literature (Bruce et al., 2010). Emotional difficulties that are MS related are known to be associated with problems managing activities of daily living, poorer vocational status, and reduced quality of life (ibid). Despite this, psychological distress is most often only conceptualised as depression within the MS literature (Kern et al., 2009) and has been the predominant focus of research into psychiatric co-morbidity (Poder et al., 2009).

1.5.1 CAUSES OF PSYCHOLOGICAL DISTRESS IN MULTIPLE SCLEROSIS

The relationship between psychological and psychiatric disorders within MS is complex and the extent to which they might be reactive to numerous psychosocial factors or even be symptoms of the neuropsychological process itself remains unclear (Haussleiter et al., 2009). While depression is a major psychological symptom, it has yet to be determined whether depressive episodes are psychosocial reactions to its progressive nature, or clinical manifestations of neurological impairment, or as highlighted by Siegert and Abernethy (2005) a combination of both. Some hypotheses put forth to date include that overlapping somatic symptoms such as fatigue may lead to inflated estimates of depression (Siegert & Abernethy, 2005); it could be related to an underlying disease process such as lesion load or brain atrophy (Feinstein et al., 2004), or it could be explained by psychosocial factors such as social support, coping, conceptions of the self and illness and stress (Arnett et al., 2008).

1.5.1.1 PHYSICAL DISABILITY

There is significant evidence that physical and neurological disability are directly associated with depression and psychological distress in MS; for example higher levels of disability are associated with more severe depressive symptoms (Chwastiak et al., 2002). As well as psychological wellbeing, health related quality of life (HRQoL) has been widely examined as an outcome measure in MS, and over 90 studies have highlighted that many patients with MS have notable decrements in HRQoL, which is often due to the effect of disability in daily living (Mitchell et al., 2005).

Although widely investigated, the relationship between depression and functional disability in MS remains unclear (Millefiorini et al., 1992; Janssens et al., 2003). Some studies suggest that patients with greater disability are more likely to experience psychological
distress (Chwastiak et al., 2002) with correlations between EDSS scores and measures of depression in a recent meta-analysis (Arnett et al., 2008) ranging from $r=.30$ (Zorzon et al., 2001) to .39 (Mclvor et al., 1984).

Other authors claim that the frequency or severity of psychological distress among MS patients is independent of the severity of MS, as reflected by the patients score on the EDSS (Beatty et al., 1990, Fassbender et al., 1998, Moller et al., 1994, Pujol et al., 1997). Such mixed findings suggest the presence of moderators or mediators (Arnett et al., 2008). Arnett et al. (2008) recommend focusing on what may interact with physical disability in order to establish a clearer understanding of the relationship between disability and distress in this client group. What follows is a discussion of some constructs that have been proposed to interact with physical disability and distress in this client group, with a focus on illness representations. As will be discussed, EA has not been looked at in this population to date, however it has shown to be a mediator of distress for many other populations and psychological problems.

1.5.1.2 PAIN, FATIGUE AND COGNITIVE IMPAIRMENT

Pain can be a serious problem affecting between 44% and 80% of people with MS (Hirsh et al., 2009). According to Arnett et al. (2008) studies examining the relationship between pain and depression have been mixed, with roughly equal numbers of studies showing a positive versus null relationship (Arnett et al., 2008). Although less extensively studied pain frequently causes interference in a variety of functional domains including sleep, recreation and occupational activities (Hirsh et al., 2009).

Up to 40% of MS patients name fatigue as their most disabling symptom, and it has been reported to cause profound disruption of quality of life in MS patients (Shah, 2009), for example fatigue has been identified as the one symptom most responsible for having to cut back on work hours (Smith & Arnett, 2005). Many MS patients with fatigue also complain of sleep disturbance, which may be secondary to neuropathic pain, spasticity, and restless leg movement. Shah (2009) recommends that further research is needed to gain a better understanding of the underlying mechanisms associated with MS sleep disturbance and fatigue.
Cognitive impairment has been detected in 40-60% of patients (Rao et al., 1991). Arnett et al. (2008) report that existing studies are evenly divided between studies that report null effects (although those reporting null effects tend to be earlier studies (Siegert & Abernethy, 2005)) and those that report significant associations. Of course one of the primary issues in the research on depression and MS is that many of the somatic symptoms of depression (fatigue and cognitive impairment) are also common features of MS (Minden & Schiffer, 1990).

1.5.1.3 COPING STRESS AND SOCIAL SUPPORT

Coping and stress are commonly linked within the empirical literature on coping, because coping strategies are typically used in response to stressful events (Arnett et al., 2008). Arnett et al. (2008) found that emotion-focused and avoidant coping strategies are consistently positively associated with psychological distress (e.g., depression), whereas problem focused and active coping strategies are inversely related to depression. Reviewing outcomes other than depression, Pakenham (1999) demonstrates that less reliance on emotion focused coping was associated with improvements in depression but also in global distress, social adjustment, and subjective health status.

Arnett et al. (2008) also highlight that the relationship between social support and depression in MS is very consistent; those with better social support are less likely to be depressed than patients with poorer social support. However, there are many coping researchers that agree that social support is a critical element of a comprehensive model of stress and coping (Lazarus & Folkman, 1984; Schreurs & deRidder, 1997; Valentiner et al., 1994).

According to the Levanthal’s self regulation model (Levethal et al., 1980; Leventhal et al., 1984) illness representations are also related to coping, and via coping, to outcomes (Vaughan et al., 2003). Coping is seen as a mediating factor between illness representations and outcome, although there is evidence to suggest that illness representations may be better predictors of outcome than coping strategies (Moss-Morris et al., 1996).
1.6 ILLNESS REPRESENTATIONS AND MULTIPLE SCLEROSIS

According to the self-regulation model cognitive representations of illness play an important role in influencing patient’s strategies for coping with an illness and associated emotional responses. Illness representations are of interest in the MS research field, as MS is marked by a lack of clarity about prognosis and a fluctuating physical condition which can create powerful challenges for psychological wellbeing (Boss & Couden, 2002). An individual’s perception of their circumstances is critical to their overall quality of life; an individual’s perception of their future, whether accurate or inaccurate, has a substantial influence (Mitchell et al., 2005).

Research on a number of medical illnesses has identified a generic structure of illness representations consisting of five dimensions (Vaughan et al., 2003, p 288):

- Identity (the label attributed to the illness and symptoms associated with it)
- Time-line (the expected duration and course of the illness)
- Consequences (the short and long term effects of the illness, and it’s physical social, economic, and emotional effects)
- Cause (the factors considered to have led to the development and onset of the illness)
- Cure/controllability (what the individual believes they or medical professionals can do to control or bring about recovery from the illness).

The overall sense that an individual makes of their illness is based on the interplay between all the illness representation components (Vaughan et al., 2003).

To date there have only been three studies published in the literature that look at the role of illness representations in MS. Using outcome measures of illness intrusiveness, activities of daily living, anxiety, depression and self esteem Vaughan et al. (2003) investigated the nature of illness representations in a sample of people with MS in the UK. Their sample consisted of 99 adults who had a formal diagnosis of MS (77 females, mean age 44.8 years). Using the Illness Perception Questionnaire (IPQ) (Weinman et al., 1996) they found that beliefs about MS along the identity, time-line, cause, and cure dimensions were found to be consistent with the general medical nature and understanding of MS, indicating that participants had developed beliefs about their illness that were accurate and
realistic in terms of conventional clinical views. Namely, participants reported that MS was associated with a wide range of symptoms, that it would last a long time, and there was no specific cause and an unlikely cure. Identity, consequences and cure/controllability components of illness representations demonstrated the greatest number of relationships with outcome measures (Vaughan et al., 2003). The belief that MS had serious consequences was related to greater difficulty in each of the outcome variables, suggesting that individuals who consider their MS to have many negative effects on their life will be more likely to encounter a range of difficulties, including increased emotional distress. Vaughan et al. (2003) state that compared to other illnesses, the illness representations of MS demonstrated a generally stronger illness identity, a more chronic timeline, and in particular, a lower sense of control.

It should be noted that in this study the type of MS experienced by the participants was not reported, and there was no indication of MS severity (e.g. EDSS scores). These two limitations reduce the generalisability of these findings. Also the majority of the participants (N=96) had received psychological input either by attendance at a psycho-education group for newly diagnosed MS or for individual input, which may have contributed to the accuracy of the participants beliefs.

Spain et al. (2007) examined the role of illness representations of people with MS in relation to quality of life. Using a large sample of 580 patients with MS in Australia, they demonstrated that illness representations were an independent factor contributing to health related quality of life. In this study, EDSS scores were a significant determinant in all domains (information processing speed, fatigue, pain, illness perceptions), except mental health (anxiety, depression). Essentially this study highlighted that while symptom severity (EDSS scores) can reduce quality of life; illness representations also have a significant role.

Jopson and Moss-Morris (2003) found that illness representations, utilizing Leventhal’s five component illness representations model (Leventhal et al., 1980), predicted adjustment to MS over and above the effects of the severity of the illness. Using hierarchical multiple regression they demonstrated that illness severity accounted for the majority of the variance in physical and role dysfunction, while patients’ illness representations were the most significant predictors of social dysfunction, fatigue, anxiety, depression and self esteem. While the sample of 168 patients had all four subtypes of MS well represented,
the sample was accessed from a support group and so may not be representative of the wider MS population.

These are important findings, as Jopson and Moss-Morris (2003) highlight that illness representations are rarely the focus of psychological interventions. While each of these studies have some limitations, the findings suggest that illness representations are worthy of further study as a cause of psychological distress in people with MS.

1.7 EXPERIENTIAL AVOIDANCE AND DISTRESS: THE EVIDENCE

EA has never been studied in relation to an MS population; however it has shown in previous research to have a significant impact on the distress experienced by different populations and psychiatric disorders (Hayes et al., 2006). In order to explore the relationship between EA and psychological distress, and elicit whether it is worthy of further investigation in a sample of MS participants, a systematic review of the literature relating to EA was undertaken as part of the current study.

Previously Chawala and Ostafin (2007) published an empirical review of the evidence for EA as a functional dimension in psychopathology. This review focused on research evidence published between 1999 and 2006, using the search terms “EA” and “ACT”, to identify 28 studies that specifically addressed EA. Some of the findings from this systematic review suggested that EA: (a) influences the likelihood of substance use relapse, (b) mediates the relation between traumatic events and general psychological distress, (c) predicts severity of symptoms in some specific disorders such as Generalised Anxiety Disorder (GAD) and trichotillomania, and (d) mediates the relationship between maladaptive coping and self-regulatory strategies, and psychological distress. Ruiz (2010) also conducted a review of ACT looking at correlational, experimental psychopathology, component and outcome studies; although not systematic, it also found that EA is related with a wide range of psychological disorders and mediates the relationship between different types of symptoms and psychological constructs.
1.7.1 AIMS AND SCOPE OF THE CURRENT LITERATURE REVIEW

The present systematic review of the literature aims to critique and synthesise new empirical research that both strengthens and updates the studies presented by Chawala and Ostafin (2007).

1.7.2 SYSTEMATIC REVIEW QUESTION

What is the relationship between EA and psychological distress?

1.7.3 METHOD

1.7.3.1 LITERATURE SEARCH STRATEGY

To locate relevant studies the following electronic bibliographic databases were searched: PsychINFO, PsycARTICLES, Web of Knowledge, Medline, Science Direct, and CINAHL.

1.7.3.2 SEARCH TERMS

The search terms used by Chawala and Ostafin (2007) were “EA” and “ACT”. For this systematic review the search term used was “experiential avoidance”. This approach to searching the databases was taken as using the search term ACT (as conducted by Chawala and Ostafin, 2007) (and ACT+EA, EA and distress/wellbeing) generated a smaller number of abstracts to check. As such, using just “experiential avoidance”, produced the greatest number of articles to search, that would address the systematic review question posed: what is the relationship between EA and psychological distress.

1.7.3.3 INCLUSION AND EXCLUSION CRITERIA

Of the 28 articles identified by Chawala and Ostafin, 3 had non clinical samples, and 16 were undergraduate samples. To address issues of generalisability and validity this review is concerned with looking specifically at clinical samples. Articles were collected from the time period 2006-2011, and the full inclusion and exclusion criteria are presented below.
1.7.3.4 Inclusion criteria:

- Articles must be about distress/psychopathology
- Articles must be empirical studies
- Articles must include clinical samples
- Articles must be reported in English

1.7.3.5 Exclusion criteria:

- Articles linking EA to a behaviour (e.g. smoking cessation, disease management, weight loss, self harm etc) will not be included, as this is not necessarily about distress
- Articles must be about EA and not a similar concept (i.e. avoidant coping)
- Articles about EA, and its relationships to behaviours (test performance etc) will be excluded
- Articles must be about individual EA (i.e. not the effect of parents EA on adolescents OCD)
- Conceptual reviews will be excluded
- Studies comparing interventions, e.g., CBT with ACT
- Single Cases/Case Series

1.7.4 SYSTEMATIC REVIEW PROCESS

A total of 1034 articles were identified and reviewed by title and abstract for relevance to the topic of EA. Any article that clearly met one of the exclusion criteria was eliminated from the review at this stage. This process left 212 abstracts that were examined in more detail to ensure that they were eligible for inclusion in the study. The clinical supervisor of the study acted as an independent rater, examining the 212 abstracts, and inter-rater agreement was 85% (include) and 90% (exclude). Since the inclusion/exclusion criteria were used to judge inter-rater agreement, each of the articles, not agreed on by both parties, were discussed in a consensus building process until agreement was reached.

Of the 212 abstracts reviewed 34 full text articles were retrieved, and from these 34, 14 studies were eligible to be included in the systematic review. The process of article
extraction is detailed in full in Appendix 1. A protocol developed by Vandenbrouke et al. (The STROBE checklist, 2007, Appendix 2) was used to assess the quality of the studies, and the use of such a protocol has been recommended as essential for the rigorous implementation of a systematic review (Schlosser, 2007). The strengthening the reporting of observational studies in epidemiology (STROBE) checklist consists of a checklist of 22 items and facilitates critical appraisal and interpretation of studies (Vandenbrouke et al., 2007). Table 1 (Appendix 3) summarises alphabetically the demographics, research design, variables studied, and effect sizes or statistics reported for each study.

1.7.5 RESULTS

1.7.5.1 OVERVIEW OF THE NARRATIVE LITERATURE REVIEW

The 14 articles that met the inclusion and exclusion criteria were reviewed considering the study design, aims and objectives, how EA was measured, the role of EA in psychopathology/psychological distress, limitations of the research, and summary highlighting implications for future research and clinical practice.

1.7.5.2 STUDY DESIGN

Of the 14 articles included in the review, 12 were cross sectional and 2 were longitudinal. The two longitudinal studies assessed patients at 2 (Manos et al., 2010) and 4 (Berking et al., 2009) time points.

1.7.5.3 AIMS OF THE STUDIES

Of the 12 cross sectional studies, 6 examined the role of EA in a number of diagnoses (e.g Generalised Anxiety Disorder (GAD; Lee et al., 2010), anxiety (Berman et al., 2010), depression (Bohlmajer et al., 2011), borderline personality disorder (Iverson et al., 2011), and Post Traumatic Stress Disorder (PTSD; Morina et al., 2008; Morina et al., 2010).

5 of the cross sectional studies looked at EA as a mediator: mediating between coping and psychopathology in chronic pain (Costa & Pinto-Gouveia, 2009), between maladaptive coping styles and psychopathology (Fledderus et al., 2010), between life hassles and delusions (Goldstone et al., 2011), between anxiety sensitivity and borderline personality
disorder (Gratz et al., 2008), and between social anxiety disorder and post traumatic stress disorder on quality of life (Kashdan et al., 2009). One of the cross sectional studies (Andrew & Dulin, 2007) examined the moderating role of EA between physical health and depression and anxiety.

Of the two longitudinal studies included in the review, one examined whether EA impedes the reduction of depression during treatment for borderline personality disorder (BPD; Berking et al., 2009), while the other examined whether EA or obsessive beliefs predicted the severity of OCD symptoms (Manos et al., 2010).

1.7.5.4 SAMPLES INCLUDED IN THE STUDIES

The samples sizes in these studies ranged from 20 (Gratz et al., 2008) to 208 (Andrew & Dulin, 2007). 12 of the 14 studies used convenience sampling, either recruiting samples from clinics or university departments, or using adverts in newspapers, or social media sites. One of the studies used a type of random sampling, called the random walk sampling strategy (Kashdan et al., 2009). This included choosing 6 out of 30 regions, then choosing a list of towns and villages within these regions to sample from. The authors state that this was done randomly. Then a street was randomly chosen to begin recruiting from. Morina et al. (2008) also used this sampling strategy; however the other study completed by Morina et al. (2010) did not give details of how participants were chosen but merely stated that “participants were contacted”, suggesting a convenience sample was used.

Three studies (Andrew & Dulin, 2007; Bohlmeijer et al., 2011; Fledderus et al., 2010) included adults over 65 within their samples. Andrew and Dulin (2007) looked specifically at an older adult population (age range 70-90+), while the other two studies indicated a fairly representative age range (aged between 24-71). The age range was not reported for two studies: Kashdan et al., (2009) gave the standard deviation (SD) while Costa and Pinto-Gouveia (2011) gave the mean age for each gender, and the SD for each gender (see Table 1, Appendix 3).

There was a marked difference in the male to female ratio in almost all of the studies. One study looked only at female participants (Berking et al., 2009). Only one study had more
males than females (Goldstone et al., 2011), while the rest ranged from participants being 55-90% female.

**1.7.5.5 THE MEASUREMENT OF EXPERIENTIAL AVOIDANCE**

EA as measured by the Acceptance and Action Questionnaire (AAQ-I, Hayes et al., 2004) or the AAQ-II (Bond et al., 2011), was the main measure of EA within each of the 14 studies reviewed.

Six of the 14 studies reviewed used the most up to date version of the AAQ scale, the AAQ-II. However these six studies used the 10 item version of the AAQ-II rather than the current seven item version (Bond et al., 2011). Five studies used the nine item AAQ-I, while three used the 16 item version of the scale.

One of the important things to note is the direction of scoring in the different versions and that the AAQ measures the continuum from EA to acceptance. In the 16 item version of the AAQ-I, high scores indicate EA (low scores indicate acceptance), which the three studies using the 16 item version followed. Unlike the 16 item version, low scores on the nine item version indicate EA (so high scores indicate acceptance). Only Gratz et al. (2008) recoded the items, on the nine item AAQ-I, so that high scores indicate greater EA.

The most up to date version of the AAQ, the AAQ-II, used by six of the studies, states that like the nine item version, low scores indicate EA. However, Costa and Pinto-Gouveia (2011) stated that higher scores on the AAQ-II equate to EA, and is the only one of the six studies, using the AAQ-II to state this. Apart from differences in the direction of scoring; one important thing to note is that the AAQ-I, and the ten item AAQ-II are not single factor measures (i.e. studies highlight that they measure more than one factor) (Bond et al., 2011), which will be discussed in more detail in the critical review.

Although the words “high EA” is used throughout this study, it is important to note that the AAQ-II is measuring the continuum between EA and acceptance, so when studies report a relationship between EA and (for example) depression, it can be assumed that the study is expressly stating that the findings report that there was EA being used by participants.
1.7.6 THE RELATIONSHIP BETWEEN EXPERIENTIAL AVOIDANCE AND PSYCHOPATHOLOGY

Nine of the 14 studies explored the relationship using correlations between EA and psychological distress. These relationships are reviewed according to the type of psychiatric disorder or symptoms the review studies looked at.

1.7.6.1 DEPRESSION

Three of the studies explored correlations between EA and depression (Andrew & Dulin, 2007; Berking et al., 2009; Costa & Pinto-Gouveia, 2011). These three studies reported positive linear correlation ranging from $r=.34$, $p<0.001$ using the Beck Depression Inventory (BDI, Berking et al., 2009) to $r=.67$, $p<0.001$, using the Depression, Anxiety and Stress Scale (DASS-21 (Lovibond & Lovibond, 1995); Costa & Pinto-Gouveia, 2011; Berking et al., 2009).

1.7.6.2 ANXIETY

Six of the 14 studies explored the relationship between EA and anxiety (Andrew & Dulin, 2007; Berman et al., 2009; Costa & Pinto-Gouveia, 2011; Fledderus et al., 2010; Gratz et al., 2008, Lee et al., 2010). Four studies reported significant linear correlations ranging from $r=.43$, $p<0.01$, using the Geriatric Anxiety Inventory (GAI (Pachana et al., 2007); Andrew & Dulin, 2007) to $r=-.47$, $p<0.01$, using the Hospital Anxiety and Depression Scale (HADS (Zigmond & Snaith, 1983); Fledderus et al., 2010). It should be noted that the negative correlation noted in the study by Fledderus et al. (2010) represents the direction of scoring of the version of AAQ used in the study, but this negative correlation still represents EA. The remaining two studies did not report the correlation between EA and anxiety.

1.7.6.3 PSYCHOLOGICAL WELLBEING/STRESS/PSYCHIATRIC SEVERITY

Two studies reported on psychological wellbeing/psychiatric distress. Fledderus et al. (2010) reported on the relationship between EA and emotional wellbeing, and found that higher acceptance (low EA) was strongly related to better emotional wellbeing ($r=.38$, $p$
Related to the concept of wellbeing, Costa & Pinto-Gouveia (2011) reported a positive correlation between EA and stress \((r=.7, p< 0.001)\). Morina et al. (2008) also reported that EA correlated significantly with psychiatric severity, as measured by the Brief Symptom Inventory (BSI, (Derogatis, 1975); \(r=.39, p <0.01\)).

1.7.6.4 DELUSIONS/PARANOIA

One study looked at the relationship between EA and delusions. Goldstone et al. (2011) reported that EA was strongly associated with delusions and delusional distress \((r= -.49 & -.61\) in a non-clinical sample, and \(r= -.40 & -.48\) in a clinical sample, i.e. lower EA > delusions and delusional distress).

1.7.6.5 POST TRAUMATIC STRESS DISORDER

Two of the studies (Kashdan et al., 2009; Morina et al., 2008) looked at the role of EA in PTSD, but only Kashdan reported on the correlation between EA and PTSD, reporting a significant correlation between EA and posttraumatic symptoms \((r=.47, p < 0.01)\).

1.7.6.6 BORDERLINE PERSONALITY DISORDER

One study reported on the relationship between EA and Borderline Personality Disorder (BPD). Iverson et al. (2011) report that EA was significantly associated with BPD symptom severity, measured using the Personality Assessment Inventory-Borderline Features Scale (PAI-BOR, Morey (1991)) after accounting for depression \((r= -.68, p <0.01, i.e \text{ lower EA > BPD})\).

1.7.6.7 OBSESSIVE COMPULSIVE DISORDER

One study reported on the relationship between EA and OCD, and this was the only study to find no relationship between EA and the construct under study. Manos et al. (2010) reported that that EA was generally not related to the severity of OCD symptoms, as measured by the Obsessive Compulsive Inventory-Revised (OCI-R, (Fao et al., (2002); \(r= -0.051-.153\)).
1.7.6.8 SUMMARY

Nine of the 14 studies reported on the correlations between EA as measured by the AAQ-I and AAQ-II. As can be seen, some of the studies reported on the relationship between one or more outcomes including depression, anxiety, and wellbeing/stress/psychiatric severity, PTSD, BPD and OCD. Eight of these nine studies reported correlations between EA ranging from $r = .34, p < 0.001$ (Berking et al., 2009) to $r = .7, p < 0.001$ (Costa & Pinto-Gouveia, 2011). These relationships are in line with ACT’s underlying theoretical model; that increased EA is shown to correlate with psychological difficulties.

One of the studies (Manos et al., 2010), reported no correlation between EA and the severity of OCD symptoms ($r = -.051-.153$). However, this study only included one measure of distress the OCI-R, and on closer inspection they did not calculate a total score, but only looked at some of the subscales by selecting relevant items.

1.7.7 EXPERIENTIAL AVOIDANCE AS A MEDIATOR

ACT has build an evidence base by studying the mechanisms purported to promote psychological change (e.g defusion, values, acceptance); these processes, through which psychological changes are thought to occur, are called mediators of change (Kazdin, 2008). Statistical mediation is thought to be more meaningful than correlation analysis as it considers a potential mechanism of change (Hayes, 2009). In terms of the studies in this review, seven of the 14 articles conducted formal meditational analysis, and one study (Andrew & Dulin, 2007) carried out moderation rather than mediation analysis.

Three of the seven mediation studies (Fledderus et al., 2010, Morina et al., 2010, Costa & Pinto-Gouveia, 2011) used procedures for meditational analysis outlined by Baron and Kenny (1986) while three of the studies (Bohlmeijer et al., 2011; Kashdan et al., 2009; Goldstone et al., 2011) carried out meditational analysis with bootstrapping procedures as outlined by Preacher and Hayes (2008). One of the studies (Gratz et al., 2008) also used the method outlined by Baron and Kenny (1986), but while the other three studies used Sobel's statistic to confirm whether the mediation was full or partial, Gratz et al. (2008) did not.
1.7.7.1 BARON AND KENNY METHOD OF MODERATION

Andrew and Dulin (2007) examined the relationship between self reported health and mental health problems in older adults. After the other three variables of interest in the study (social support, functional impairment, self reported health) were added to a regression equation, EA contributed 4% of the unique variance in depression ($\beta=0.22; p<0.01$). In line with the procedures outlined by Baron and Kenny (1986) when an interaction term (self reported health x AAQ scores) was added, this contributed a further 8% of the variance of depression. With anxiety as the dependent variable, EA contributed to 11% of the unique variance of anxiety, but the interaction term (self reported health x AAQ scores) contributed a further 20% of the variance of anxiety, indicating a large moderating effect of EA on self reported health and anxiety.

1.7.7.2 BARON AND KENNY METHOD OF MEDIATION

Three of the four studies using the Baron and Kenny (1986) method used the Sobel test. The mediation is partial if Sobel $z$ is $p<0.05$, and full if Sobel $z$ is $p= 0.00$ (Costa & Pinto-Gouveia, 2011).

Only one of the studies suggested that EA was a full mediator between the effect of detached/emotional coping in depression (Costa & Pinto-Gouveia, 2011), reporting that $z=-3.08; p=0.00$. Also within this study, EA partially mediated between rational coping and depression ($z= -2.16; p = 0.003$), and between rational coping and stress ($z= - 2.20, p = 0.03$).

EA fully mediated the effects of passive coping on depression ($z= 2.79, p =0.01$), and anxiety ($z= 4.36, p=0.01$), and it partially mediated the effects of passive coping on emotional wellbeing ($z= -.26, p= 0.05$), and psychological wellbeing ($z=-2.05, p = 0.05$) in the study by Fledderus et al. (2010). However it should be noted that Fledderus et al. (2010) state that EA fully mediates all of the four variables mentioned above, which is a detour from the guidance about $p$ values followed by Costa and Pinto-Gouveia (2011).

Morina et al. (2010) found that EA partially mediated the relationship between somatic distress and quality of life ($z= -3.20, p= 0.02$), and also partially mediated the relationship between somatic distress and psychological distress ($z= 2.38, p = 0.02$).
While Gratz et al. (2008) did follow the procedures outlined by Baron and Kenny (1986) they used a hierarchical logistic regression analysis to determine if EA mediated the relationship between anxiety sensitivity and BPD. They found that the model including EA was reliably different to the model with only anxiety sensitivity, and that anxiety sensitivity did not remain a significant predictor when controlling for EA.

1.7.7.3 PREACHER AND HAYES BOOTSTRAPPING METHOD OF MEDIATION

While Goldstone et al. (2011) used the guidance by Baron and Kenny (1986) to determine whether EA mediated the relationship between life hassles and two measures of delusions in a clinical and a non-clinical sample, in order to test the significance of the mediation relationships, they used the bootstrapping method used by Preacher and Hayes (2004). The Preacher and Hayes (2004) method uses nonparametric bootstrapping with 5000 samples to derive a 95% confidence interval for the impact of a mediator. An indirect (meditational) effect is considered significant if zero is not contained in the 95% confidence interval (ibid).

They estimated the indirect effect of EA upon delusions to lie between .0133, and .5562, and between .1687 and .4275 for the indirect effect of EA on delusional distress in the non-clinical sample. For the clinical sample, bootstrapping values were between .0817 and .4538 for delusions, and between .0500 and .2072 for delusional distress. As zero was not in any of the intervals (Goldstone et al., 2011), this indicated a significant indirect effect of EA in the relationship between life hassles and both measures of delusions.

Many researchers have emphasised the importance of paying more attention to the mechanisms of change in effective treatments (e.g Kazdin, 2007), and Bohlmeijer et al. (2011) have done just that by showing that improvements in acceptance during their intervention for adults with depressive symptomatology mediated the effects of the intervention on symptoms at follow up. They highlight bootstrapping values between -4.10 and -.67 to evidence that the mediating effect of improvement of AAQ-II scores from baseline to post-treatment were significant.

Using the bootstrapping techniques advocated by Preacher and Hayes (2004), Kashdan et al. (2009) also used Sobel’s test of mediation. Using Sobel’s test they highlighted that EA
partially mediated the effects of social anxiety ($z = 2.48$, $p = 0.01$), and PTSD ($z = 2.70$, $p = 0.007$) on quality of life scores. Bootstrapping means, also confirming the mediating effect of EA, were 0.66 and 0.61, for social anxiety disorder and PTSD respectively.

1.7.8 THE PREDICTIVE VALUE OF EXPERIENTIAL AVOIDANCE

Six studies that did not look at meditational analysis instead focused on the predictive value of EA, which is more a test of the underlying model of ACT, and its utility in providing interventions from an ACT perspective.

Two of these studies (Berman et al., 2010, Manos et al., 2010) found that EA did not predict anxiety symptom severity (Berman et al., 2010), and OCD symptom severity (Manos et al., 2010). Berman et al. (2010) report that when EA is added to a hierarchical regression analysis it added no additional variance in anxiety scores (as measured by the Beck Anxiety Inventory (BAI; Beck et al., 1988), and that the physical concerns subscale of the anxiety sensitivity index (ASI-3; Taylor et al., 2007) was the only significant unique predictor of anxiety scores ($\beta = 0.49$, $p < 0.01$). However, given that the BAI has been noted to assess physiological correlates of anxiety, it is not surprising that the physical symptoms subscale of the ASI-3 was significantly associated with it.

As discussed earlier, Manos et al. (2010) results indicated that EA had limited association with measures of OCD severity and did not add significantly to prediction of OCD symptom dimensions above and beyond obsessive beliefs and depression.

Providing support for the causal effect of EA on depression (that is that EA is a cause rather than a consequence of depression) Berking et al. (2009) looked to a sample of women with BPD. Their results demonstrate that the AAQ-I was significantly associated with changes in both the outcome measures of depression the BDI, and the Hamilton Rating Scale for Depression (HRSD, Hamilton, 1960) (the HRSD $\beta = 12.858$, $p < 0.05$, and the BDI $\beta = 9.568$, $p < 0.05$), but neither the HRSD nor the BDI scores were significantly associated with subsequent changes in the AAQ (HRSD, $\beta = -0.002$, BDI, $\beta = 0.011$).

Highlighting that EA may be a central process in BPD, Iverson et al. (2011) looked at EA and two other domains of emotional functioning: emotion dysregulation and distress tolerance. While emotion dysregulation was significantly associated with BPD symptom
severity ($r=.55, p<0.01$), only EA was significantly associated with BPD symptom severity after controlling for depression ($\beta = -.51, p<0.05$).

Testing the assumption that EA is the main underlying process in Generalised Anxiety Disorder (GAD) Lee et al. (2010) looked at a clinical and a non-clinical sample. The individuals with GAD reported higher rates of EA, and greater distress about anxious, depressive, angry and positive emotions. Also the AAQ was able to significantly classify GAD status.

In order to assess the role EA plays in the maintenance of PTSD symptoms Morina et al. (2008) compared three groups, a current PTSD group, a recovered PTSD group, and a non PTSD group. There was a significant group difference in EA between groups ($F(2,81)= 8.40, p <0.01$), and subsequent post-hoc comparisons of means revealed that participants in the current PTSD group contained significantly higher AAQ scores ($M= 43.4, SD= 5.6$) than those in the recovered PTSD group and the non PTSD group ($M=38.8, SD= 5.4$ and $M =35.9, SD= 7.7$). The recovered PTSD and non PTSD groups did not differ significantly in EA, which has led Morina et al. (2008) to suggest that EA may also be an aetiological factor for PTSD.

1.7.9 SUMMARY

For this review, 14 articles were sourced that met the inclusion and exclusion criteria. Each of the 14 studies were reviewed considering their design, aims and objectives, how EA was measured, and its relationship to psychological distress.

Of the 14 articles that were reviewed 12 used a cross sectional design, and two used a longitudinal design. The samples sizes in these studies ranged from 20 (Gratz et al., 2008) to 208 (Andrew & Dulin, 2007). The mean age of participants ranged from 27 (Berman et al., 2010) to 80-84 (Andrew & Dulin, 2007). The gender ratio ranged from 44% (Goldstone et al., 2010) to 100% (Berking et al., 2010) female.

EA was measured by using the Acceptance and Action Questionnaire (AAQ), but eight used the older version (either the nine or 16 item AAQ-I). The remaining six used the 10 item AAQ-II; however the current version of the AAQ-II is actually a seven item version (Bond et al., 2011).
Nine of the 14 studies explored correlations between EA and psychological distress (depression, anxiety, psychological wellbeing, stress, psychiatric severity, delusions, PTSD, BPD and OCD). Eight of these studies reported positive correlations between EA ranging from $r = .34, p < 0.001$ (Berking et al., 2009) to $r = .7, p <0.001$ (Costa & Pinto-Gouveia, 2011). Only one of the studies (Manos et al., 2010), reported no correlation between EA and the severity of OCD symptoms ($r = -.051-.153$).

Seven of the articles carried out meditational analysis and one a moderation analysis, with EA as the key mediator/moderator. All of these studies reported good evidence that EA is a mediating/moderating variable between a range of measures of distress.

Two studies found that EA did not predict either OCD symptoms severity, or anxiety symptom severity. However the remaining four studies looking at the predictive value of EA found good support that it predicts depression, BPD symptom severity, GAD, and PTSD symptoms.

1.7.10 CRITICAL REVIEW AND DISCUSSION

Based on the narrative review of the 14 studies, a critical review will be undertaken regarding issues of sampling, methods, measures and theoretical issues, before a summary of the issues is considered and the role of EA is weighed as to whether it should be investigated in MS populations.

1.7.10.1 SAMPLES

In terms of the populations sampled, the 14 studies considered in the systematic review consist only of mental health populations. As such this review highlights that many physical health conditions have not been studied in terms of the role of EA, despite some authors stating that ACT is suited to long term conditions (Hayes et al., 1999; Ruiz, 2010). This finding is similar to the results generated by Chawala & Ostafin (2007) whose systematic review did not highlight any studies looking at EA in clinical health populations. A cursory glance at the official website for the Association for Contextual Behavioural Psychology (http://contextualpsychology.org) highlights that there have been Acceptance and Action Questionnaires (AAQ) developed for diabetes, epilepsy, substance abuse,
weight, smoking, body image, chronic pain, irritable bowel syndrome, tinnitus and auditory hallucinations. It may have been a limitation of the systematic review to exclude papers that were about behaviours (for example a paper by Gregg et al., (2007) was about diabetes self management), however it also highlights that many of these studies did not meet other requirements of the systematic review, for example using undergraduate samples, or not including measures of distress.

1.7.10.2 METHODS

In keeping with the results of the systematic review conducted by Chawala and Ostafin (2007), and that by Ruiz (2010) the review of the correlational analysis provides additional support that EA is significantly involved with a wide range of psychological disorders. In addition its status as a mediator of distress is growing within the literature.

Chawala and Ostafin (2007) stated that little research had been conducted on EA as a mediator of distress. This systematic review addresses this issue identifying eight studies that highlight that EA does act as a mediating variable. The importance of research on EA as a mediator of psychological distress is so evidence accumulates to suggest that focusing treatment on reducing EA may lead to improvements in a particular problem/disorder. As such these eight studies provide support to suggest that ACT is working through one of their main hypothesised processes (EA).

It should be noted that all of these meditational analyses were cross sectional designs. True tests of mediation require longitudinal designs where the change in the hypothesised mediator is measured temporally before the outcome measure (Hayes, 2009, Selig & Preacher, 2009). Also mediation itself does not show causation, but rather the functional importance of an intervention’s impact on a process, and that process’ effect on an outcome (Hayes, 2009). It may have been important then, considering this view of mediation by Hayes, to have included intervention studies within the review, although Ruiz (2010) has highlighted that the results in this field of ACT enquiry (mediation) are still preliminary, and so would benefit from using longitudinal designs.

Despite these shortcomings, the mediation analysis used strict criteria for mediation and moderation pulling from the guidelines outlined by Baron and Kenny (1986), and also by Preacher and Hayes (2004). Baron and Kenny’s methods for meditational analysis have
been the most influential in the literature with Zhao et al. (2010) highlighting that their 1986 paper has been cited by 11,480 journal articles, and are now so well known they are used by authors and requested by journal reviewers almost reflexively (ibid). However, the methods developed by Preacher and Hayes (2004) have arisen due to certain criticisms of the Baron and Kenny method, which is argued to have low power in comparison to newer bootstrap tests (Zhao et al., 2010). To date though, none of the studies have engaged with using their variables under study to move beyond mediation analysis to propose a model of psychological distress in the areas of psychopathology studied, with the role of EA clearly outlined and included.

1.7.10.3 MEASURES

One of the major limitations of all of the studies incorporated in this systematic review is their use of measures of EA. The Acceptance and Action Questionnaire-I (AAQ; Hayes et al., 2004) is the most widely used measure of EA in the literature to date, consisting of nine to 16 items depending on the version (Bond et al., 2011). A meta-analysis of 27 studies that used this measure found that it predicted a wide range of quality of life outcomes (depression, anxiety, job satisfaction) with an average effect size of $r = .42$ (Hayes et al., 2006). Due to unnecessary item complexity (e.g. “When I evaluate something negatively, I usually recognise that this is just a reaction, not an objective fact”) and the subtlety of the concepts addressed, the internal consistency of the AAQ-I has often been a problem (Bond et al., 2011) with alpha coefficients of .70, and test-retest reliability of .64 over four months (Hayes et al., 2004). Alpha levels have sometimes been lower, especially with community samples and certain subpopulations (lower levels of education) (Bond et al., 2011). As such the factor structure of the AAQ has been unstable, with the original validation study identifying nine and 16 item single factor versions, but other research identifying a two factor 16 item version (Bond et al., 2011).

These issues were addressed in developing the AAQ-II, but the AAQ-II started out as a 10 item scale, which is the one used in all of the studies included in the review, but after final psychometric analysis was reduced to a seven item scale (Bond et al., 2011). The AAQ-I and AAQ-II correlate at .97, but the AAQ-II has better psychometric consistency.

In the review conducted by Chawla and Ostafin (2007) they queried the conceptualization of EA, as they stated it was unclear whether EA should be viewed as a broad and
univariate construct, or a multifaceted construct with several dimensions. This confusion is only fuelled then, by the use of various measures of the AAQ.

1.7.10.4 THEORETICAL ISSUES

Chawala and Ostafin’s (2007) major criticism of the EA literature revolved around whether EA was a separate construct from the construct of coping. Dennison et al. (2009, p. 144) state that coping strategies are “the conscious efforts an individual makes to manage internal or external stressors that they perceive as taxing their existing resources”. The use of certain emotion-focused strategies (e.g. wishful thinking (hoping for a miracle), and escape-avoidance coping (e.g. forgetting the whole thing) are reported by Dennison et al. (2009) to be strong and consistent predictors of worse adjustment across studies in the MS literature. While the relationships between avoidant coping and poor outcomes seem well established in empirical studies, what is less clear is whether EA is distinct from emotional and avoidant coping strategies (Chawala & Ostafin, 2007; Karekla & Panayiotou, 2011).

EA does share some commonalities with other concepts in the literature such as emotion dysregulation, distress intolerance, intolerance of uncertainty, cognitive and emotional suppression, and mindfulness (Boulanger et al., 2009). However, EA has never been described as a form of coping and in general not related to the coping literature (Karekla & Panayiotou, 2011). Though coping models include the broader concept of avoidance and factors that can be thought of as EA (mental disengagement, denial), to date these factors have not been clustered together or investigated as EA (ibid).

Karekla and Panayiotou (2011) highlight that while the process of EA looks like the avoidant coping strategies (described above, i.e. wishful thinking, escape-avoidance), Fledderus et al. (2010) state that an important difference is revealed when looking at the way these constructs are operationalised. EA assess whether a person engages in attempts to change the form, frequency, or situational sensitivity of unwanted private events, while coping styles are measured in terms of how often a strategy is used and what the content of the actual behaviour is to cope with the stressful situation (Fledderus et al., 2010). EA is more focused on the function and context of behaviour, whereas coping styles are focused on the frequency and content of the behaviour (Hayes et al., 1996, cited in Fledderus et al., 2010).
In a recent attempt to empirically address this question, Karekla & Panayiotou (2011) showed that the more participants report high levels of EA (as measured by the 10 item AAQ-II), the more they tend to use emotion focused and avoidant types of coping. They also state that both EA and coping predicted psychological distress and wellbeing, with most variance explained by coping but some additional variance explained by EA. Their study concludes that coping styles and EA are largely overlapping but not identical constructs. It should be noted that this study used the 10 item AAQ-II, rather than the current 7 item AAQ-II, and the 10 item AAQ-II is likely to be a two factor structure (Bond et al., 2011). Of interest in this study, the authors noted that individuals who were high in EA also used coping styles not typically considered avoidant such as seeking emotional support, venting and self-blame; suggesting that individuals high in EA not only suppress and dampen affect but also process and express it in a maladaptive way.

As has been considered in the systematic review, EA has been shown to fully mediate the relationship between detached/emotional coping and depression, and to partially mediate between rational coping and depression and stress (Costa & Pinto-Gouveia, 2011); EA also mediated the effects of passive coping on depression, anxiety, emotional wellbeing and psychological wellbeing (Fledderus et al., 2010). However, the limitations highlighted in the measurement of EA are likely to have added to the lack of clarity that has dogged the literature to date.

1.7.10.5 SUMMARY

Two of the fourteen studies (Berman et al., 2010; Manos et al., 2010) did not provide any support for the role of EA in psychological distress, while the other 12 studies provide good support for the role of EA in psychological distress. These positive associations generally accord with the wider literature on EA, for example Ruiz (2010), incorporating the correlations from 22 studies, suggested a weighted correlation of $r=.55$ between some version of the AAQ and standard measures of depression, and a weighted correlation of $r=.52$ between some version of the AAQ and standard measures of anxiety. These relationships provide a rationale for investigating the role of EA in different populations. Although EA has been investigated as a mediator of distress, these studies may have limited generalisability due to the use of cross sectional designs. Despite this, the evidence is growing that EA may play a role in mediating distress in psychopathology, and as such it
is worthy of investigating the mediating role of EA in other populations. A major limitation of the literature has been the inadequate definition of EA which is underpinned by the less than adequate measurement of EA using previous versions of the AAQ; the AAQ-I.

It should be noted that although the review was systematic, it cannot be considered to be exhaustive due to the narrow search terms used. For example, a search of the MS literature identified a paper examining the role of acceptance (rather than EA) in adjusting to MS over time (Pakenham & Fleming, 2011), and this paper, due to its relevance, will be discussed below.

**ACCEPTANCE & MS:**

Pakenham and Fleming (2011) developed an MS specific measure of the AAQ, the MS Acceptance Questionnaire (MSAQ) to investigate the relationship between MS and adjustment (lower distress, higher positive affect, life satisfaction, marital adjustment and better subjective health status). They based the MSAQ on the 16 item AAQ. The MSAQ, also a 16 item questionnaire, yielded a two factor structure: ability to take action despite MS and a need for control, or a lack of willingness to experience MS symptoms and unwanted internal events related to MS.

Of interest to the current study, the MSAQ was stated to be a stronger predictor of adjustment to MS than the AAQ (16 item version), however only the action dimension of acceptance emerged as a consistent predictor of adjustment including lower distress. The willingness factor, while related to lower positive affect, was unrelated to three of the adjustment outcomes including distress. As such, and in consideration of the wider debate about measurement issues within the field of EA considered earlier, Pakenham and Fleming (2011) concluded that while there is some evidence that acceptance plays a role in adjusting to MS over time, further investigation is needed to examine the factor structure of the MSAQ across other MS samples to refine its applicability to this population. It is likely that the use of the AAQ-I, rather than the more psychometrically sound AAQ-II may have impacted on the results garnered using the MSAQ.
1.8 CHAPTER SUMMARY

MS is the most common neurological disease of young adults and implies multiple psychosocial challenges, with prevalence estimates for depression of around 50% affecting between 15 to 47% of the MS population (Gay et al., 2010). Other psychiatric symptoms such as anxiety, social anxiety (Poder et al., 2009) irritability, and emotional lability are also common (Kern et al., 2009). Apart from clinical psychiatric diagnosis, sub-threshold psychiatric symptoms and psychological distress are frequently present (Feinstein & Fienstein, 2001).

While other psychological constructs have been investigated in relation to distress in MS, such as coping and social support, EA is one construct that has not been investigated in this population. EA is defined as the unwillingness to remain in contact with aversive private events and the action taken to alter the aversive experiences or events that elicit them (Hayes et al., 1996). EA is one of six processes that underpin the model of mental health as outlined by ACT (Strosahl & Robinson, 2009). To date there is good evidence that EA is related to several forms of psychopathology (Boulanage et al., 2009, Chawala & Ostafin, 2007). A systematic review of the literature identified 14 studies, eight of which reported positive correlations between EA and various forms of psychological distress: depression, anxiety, psychological wellbeing, delusions, BPD, OCD, PTSD. Six studies focused on the causal role of EA. Four of these studies highlighted that EA is a cause of, rather than a consequence of, depression (Berking et al., 2009); that it plays a central role in BPD (Iverson et al., 2011); that it is one of the main underlying processes in GAD (Lee et al., 2010); and that it plays a role in maintaining PTSD symptoms (Morina et al., 2008).

The systematic review also identified 7 studies that highlighted that EA acted as either a full or partial mediator between various constructs (self reported health, detached emotional coping, rational coping, passive coping, somatic distress, anxiety sensitivity, life hassles, social anxiety) and outcome measures of distress (quality of life, depression, anxiety, emotional wellbeing, BPD symptom severity, delusional distress). In addition Pakenham and Fleming (2011) developed a MS specific measure of acceptance, the MSAQ, which, despite the preliminary design, highlighted that the action part of the MSAQ, predicted distress in MS.
In trying to understand what causes psychological distress in the MS client group, one of the most researched hypotheses has been that level of disability causes the level of psychological distress, and there is significant evidence that physical and neurological disability is associated with depression and psychological distress in MS (Chwastiak et al., 2002). However there is an equal number of studies that highlight no relationship between disability and distress, which suggests that other factors are moderating or mediating the relationship (Arnett et al., 2008). Given the evidence for the mediating role of EA in psychopathology (such as depression, anxiety, social anxiety disorder which are common psychological problems faced by people with MS); it is hypothesised that EA may mediate between disability and distress in MS; however this has not been tested to date. Authors have suggested that ACT is well suited to long term health conditions (Hayes et al., 1999; Ruiz, 2010) such as chronic pain and diabetes (Hayes et al., 2006). Using a small sample (n=15) Sheppard et al. (2010) found that depression decreased over time following a 5 hour ACT workshop for people with MS. However, despite this evidence that ACT might be a helpful intervention, and the study conducted by Pakenham and Fleming (2011) looking at acceptance and adjustment in MS, there has been no research exploring the role of EA and psychological distress with MS populations.

Illness representations of MS may also operate as a mediator between physical disability and forms of psychological distress (e.g depression, Arnett et al., 2008). The overall sense that an individual makes of their illness is based on the interplay between the components of illness representations: identity, time-line, consequences, cause, and cure/controllability. Although research on the role illness representations play in distress experienced by people with MS is in its infancy, to date researchers have shown that individuals who consider their MS to have many negative effects on their life will be more likely to encounter a range of difficulties, including increased emotional distress (Vaughan et al., 2003, Jopson & Moss-Morris, 2003). No study to date has examined how illness representations may moderate or mediate the relationship between psychological distress (e.g. depression) and physical disability (Arnett et al., 2008).

1.9 INTRODUCTION TO THE CURRENT STUDY

1.9.1 AIM

The aim of this study is to explore factors associated with psychological distress in a sample of participants who have MS. It aims to explore the relationships between level of
symptoms, illness representations, and EA, and to investigate the influence of each of these factors on psychological distress. It is hypothesised that EA will mediate the relationship between level of symptoms and distress, and between illness representations and distress, which if confirmed may support the use of interventions addressing illness beliefs and avoidance, such as those outlined by ACT, with clients with MS. The psychological factors under study (illness representations and EA), unlike illness factors (physical symptoms) are potentially modifiable through psychological interventions (Dennison et al., 2009).

1.9.2 RESEARCH QUESTION

How are severity of symptoms, illness beliefs and EA related to psychological distress in participants with MS?

1.9.3 PATH ANALYSIS APPROACH

Path analysis is a subset of Structural Equation Modeling (SEM) (Stoelting, 2002) and is a statistical technique for analysing relationships among a set of variables to reveal the relative effect of each variable on another variable (Schumacker & Lomax, 2004). Path analysis starts with outlining the proposed relationships between a set of variables based on theory, research and logic (Klem, 1995). Along with a path analysis, a path model provides a pictorial representation of hypothesised relationships among variables (Stage et al., 2004).

In path models, there are two types of variables: endogenous and exogenous (Klem, 1995). The values of endogenous variables are explained by one of more of the variables in the model, while the values of exogenous variables are taken as given; the model does not try to explain them (Klem, 1995). The distinction is similar to that between dependent (endogenous) and independent variables (exogenous) (ibid). However in a path model a variable can be both independent and dependent. An endogenous variable has arrows coming towards it, and can be both a dependent and independent variable. This is represented when there are both incoming and outgoing arrows in the path model (ibid). Exogenous variables have no arrow links towards them from other variables in the model (Klem, 1995, Inan & Lowther, 2010).
1.9.4 HYPOTHESED PATH MODEL

In order to explore factors impacting on psychological distress in MS a proposed model is presented in Figure 1.1. This model has been proposed based on the theory and research reviewed in the previous sections. The path model consists of one exogenous variable: level of disability (EDSS) and three endogenous variables: experiential avoidance (AAQ-II), illness representations (BIPQ), and psychological wellbeing (GHQ-30).

**Figure 1.1: Hypothesised model of psychological distress based on theory and research**

1.9.5 PURPOSE OF STUDY

Considering the path models in Figure 1.1 as a research framework, the study examined the following hypotheses:

1) There will be a positive relationship between physical symptoms and psychological distress
2) There will be a positive relationship between illness representations and psychological distress
3) There will be a positive relationship between experiential avoidance and psychological distress
4) The relationship between disability and psychological distress will be mediated by experiential avoidance
5) The relationship between illness representations and psychological distress will be mediated by experiential avoidance
6) The relationship between disability and psychological distress will be mediated by illness representations

A secondary aim of the research is to highlight the difference that may occur if distress is conceptualised as depression.
CHAPTER TWO: METHODS

2.1 INTRODUCTION

This chapter will describe the methods used for this research study considering the design, sample, measures used, the procedure for gathering the data, and ethical considerations.

2.2 DESIGN

A cross sectional, within subjects design was used. The analysis then examined the theoretical model that has been outlined in Figure 1.1 in section 1.9.4. Path analysis is viewed by many as an extension of multiple regression, but instead of predicting to one single dependent variable, is concerned with the predictive ordering of variables and allows researchers to test a theory of casual order among a set of variables (Klem, 1995). The starting point for such an analysis is the theory of the causal relationships among a set of variables which is expressed as a path model (ibid).

Each variable in a path analysis should be measured on an interval scale, or an ordinal scale where the data can be treated as interval (Klem, 1995). Path analysis allows the magnitude of hypothesised effects to be estimated, and also allows researchers to test whether the model is consistent with the observed data (ibid). If the model is not consistent with the data, it can be rejected as unlikely; however it cannot be proved that a path model is correct as different models can be consistent with the same observed data (Klem, 1995).

Simultaneous multiple regression analyses were used to assess predictors of distress, as outlined by the path model in section 1.9.4. In simultaneous multiple regression all independent variables (IV) are entered into the regression at the same time, and so each IV is evaluated in terms of what it adds to predicting the dependent or outcome variable, that is different from the predictability afforded by all the other IVs (Tabachnick & Fidell, 2007). One simultaneous regression analysis is needed for each endogenous variable (Klem, 1995).

This method of carrying out path analysis has been outlined by a number of authors (Judd & Kenny, 1981; Kenny et al., 1998) but the guidelines by Klem (1995) have been used for
this study, as they provide the clearest account of how to conduct path analysis using multiple regression, when it is not possible to use more sophisticated computer packages designed for path analysis (e.g., AMOS for SEM). Although SEM was considered to test the overall model’s adequacy of fit, this approach was not used due to sample size limitations (Thompson, 2000).

2.3 POWER ANALYSIS

There is little consensus about how to estimate sample size for path analysis (Hoe, 2008), however path analysis involves a series of multiple regression analyses to test the predicted relationships between variables (Klem, 1995). As such methods for determining the number of participants in multiple regression were consulted.

Kline (1998) recommends that the sample size should be 10 times (or ideally 20 times) as many cases as parameters. In path analysis, each measured variable usually has three parameters: its path coefficient, its variance, and the disturbance term (so 30 participants for each variable) (ibid). Harris (1985) recommends that the number of subjects be \( N + m > 50 \) \((m=\) the number of predictors (3)) \((N=53)\), while Green (1991) suggests a rule of thumb for multiple correlations whereby \( N > 50 + 8m \) \((N=74)\), or \( N > 104 + m \) \((N=107)\) for a partial correlation suggesting that the sample size should be between 53 participants and 107. These sample sizes are similar to those suggested by Cohen (1992), in order to detect a medium effect size \((N=76)\), using three predictors. Considering the above information, it appears that a sample size of 53 is the lowest recommended number, and 107 the largest.

2.4 SAMPLE

The study population comprised adults over the age of 18 with a current diagnosis of MS (MS) who were known to a centre for neuroinflammatory diseases covering a large geographical area in South Wales.

2.4.1 INCLUSION CRITERIA

The ability to speak fluent English was prerequisite to participation as valid and reliable versions of each measure were not available in other languages (e.g., Welsh). Having a
confirmed diagnosis of MS was also a prerequisite of the study. Participants were included if they were able to give informed consent to take part in the study (indicated by response or non-response).

Although the questionnaire battery was designed for anonymous completion, participants were invited to ask a carer/family member to assist them to complete the battery of research questionnaires.

2.5 MEASURES

The variables under examination in this study were physical disability (level of symptoms), illness representations, EA and psychological distress. In addition to a background information questionnaire, four established questionnaires were used to measure these variables and these five components comprised the questionnaire battery. To reduce any potential burden on participants measures were selected that had suitable psychometric properties, while also being relatively quick to complete. Also due to the cognitive impairments that individuals with MS can experience it was considered important to choose measures that were clear and simple.

The battery was printed over 10 sides of A4 paper. Pages were stapled together, with the consent form, and instructions were provided to encourage completion in order of presentation. The battery, in order that measures were presented, comprised the following five measures:

1) A background information questionnaire (Demographic Questionnaire)
2) The Expanded Disability Status Scale: self report (EDSS)
3) The Acceptance and Action Questionnaire-II (AAQ-II)
4) The Brief Illness Perception Questionnaire (BIPQ)
5) The General Health Questionnaire (GHQ-30)
2.5.1 Demographic Questionnaire

Demographic information collected included the participants age, gender, length of time since experiencing the symptoms of MS, the year when they were diagnosed, and the type of MS they have (Appendix 4). It was made clear to participants in the information sheet that if they did not provide this information it would be accessed from their file, however they also had to give their consent for this.

2.5.2 The Expanded Disability Status Scale (EDSS): self report

Levels of symptoms were measured using the expanded disability status scale-self report measure (Ingram et al., 2010). This measure is based on the expanded disability status scale (EDSS) (Kurtzke, 1983), a measure used in most clinical trials, and accepted as the gold standard (Ingram et al., 2010).

The EDSS, an ordinal measure, is the standard measure of disease progression and the degree of neurological impairment in MS clinical practice and clinical trials (Chwastiak et al., 2002). The EDSS divides functioning into eight systems, pyramidal, cerebellar, brainstem, cerebral, bowel and bladder, sensory, visual, and other; impairment in each system is graded and then summed across the eight systems. Scores for the total scale can range from 0 (no neurological abnormality) to 10 (death from MS). As a shorthand, Chwastiak et al. (2002) highlight that someone with a score lower than four is ambulatory, a patient with a score between 4.5 and 6.5 has disability severe enough to limit daily activity, and a patient with a score of 7 is essentially restricted to a wheelchair.

Current functioning was determined by the EDSS self report (EDSS-SR), as developed by Ingram et al. (2010) (Appendix 5). The EDSS-SR, asks patients to select from a series of statements describing walking ability as specified by the EDSS with reference distance between well recognised local landmarks; for example 500m equated to the length of one of the well-known city centre shopping streets. Patients who could walk at least 500m without rest or aid were scored at EDSS equal or less than four. The EDSS-SR is unable to score any EDSS score below 4 (as this would require an individual neurological examination). As such, a review of patient records was conducted to identify neurologist derived scores below 4. The mean EDSS score from 2399 neurological examinations on
MS patients not currently in relapse where a score of less than four was recorded was 2.18. As such, any value under four was entered as 2.18 as their EDSS score.

EDSS scores derived from questionnaires have good levels of correlation (intraclass correlation coefficients of 0.69 to 0.89) with clinician-derived data with perfect agreement noted in 75.9% and 88.6% allowing for accepted intra-observer variation of +0.5 EDSS points (Ingram et al., 2010).

2.5.3 The Acceptance and Action Questionnaire-II

The Acceptance and Action Questionnaire (AAQ-I; Hayes et al., 2004) is the most widely used measure of EA (Bond et al., 2011). The AAQ-I was developed in order to establish an internally consistent measure of ACT’s model of mental health and behavioural effectiveness.

The original item pool for this short (nine to 16 items) Likert style scale was generated by Acceptance and Commitment Therapy (ACT) therapists and researchers to represent the phenomena that constitute EA. The final scale contained items on negative evaluation of feelings, avoidance of thoughts and feelings, distinguishing a thought from it referent, and behavioural adjustment in the presence of difficult thoughts and feelings.

The AAQ-II was developed by Bond et al. (2011) to address the shortcomings of the AAQ-I. Findings indicate that the reliability of the AAQ-II is consistently above the AAQ-I, with a mean alpha coefficient across samples of .84, with 3 and 12 month test-retest reliability .81 and .79, respectively (Bond et al., 2011). The AAQ-II was designed to assess the same construct as the AAQ-I and the two scales correlate at .97, but the AAQ-II has better psychometric consistency. Most importantly factor analytic findings suggest the AAQ-II is a unidimensional measure (Bond et al., 2011).

The current version of the AAQ-II (Appendix 6) requires participants to answer seven items with a seven point Likert type response scale, responses range from never true to always true. Higher scores on the AAQ-II indicate greater EA (less acceptance). It should be noted that the version of the AAQ-II sent to participants, and in Appendix 6, is the 10 item AAQ-II; however items 1, 6 and 10 were omitted from scoring the AAQ-II, in line with current recommendations.
2.5.4 The Brief Illness Perception Questionnaire

The Brief Illness Perception Questionnaire (BIPQ, Broadbent et al., 2006) is a nine item scale designed to rapidly assess the cognitive and emotional representations of illness. The BIPQ was used to assess patient’s illness perceptions along the dimensions of consequences, timeline, identity, personal control, treatment control, emotional representation, concern and coherence (Appendix 7). Each dimension is measured by a single item scored on an 11 point Likert scale, with higher scores indicating stronger endorsement of that item (e.g. high identity scores indicate that the participant experiences more symptoms, Broadbent et al., 2006). In order to ensure data could be treated as interval level data, the composite score was calculated.

A composite BIPQ score, with higher scores indicating a more negative perception of the illness (Wilson et al., 2011), was derived in accordance with the authors instructions (Broadbent et al., 2006). Broadbent describes that the composite score represents the degree to which the illness is perceived as threatening or benign. The composite score reflects the overall positivity (low total BIPQ= a benign view of the illness) or negativity (high total BIPQ= a more threatening view of the illness) of individual’s illness perceptions. The BIPQ evaluates the quantity or strength of illness perceptions, not the content of these specific beliefs (van Oort et al., 2011). This approach (taking the composite score) is consistent with the current approach taken by illness representations research, when investigating its relationship to, or ability to predict, other constructs (e.g Knowles et al., 2011; Wilson et al., 2011). In addition, using the composite score is necessary for the statistical analysis used; path analysis, that requires data that can be treated as interval. The causal scale (asking participants to list what they felt caused their MS) was not incorporated into this study, and only the summary score was of interest for this study.

The BIPQ was chosen over the longer version IPQ-R, primarily due to its brevity; however there are moderate to good associations between the BIPQ and the IPQ-R on all the equivalent dimensions (Broadbent et al., 2006). Research demonstrates that the BIPQ items, have very good test-retest reliability (from an \( r \) value of .48 (coherence) to .71 (consequences) with \( p \) values <0.001), and when compared to the IPQ-R, good concurrent (from an \( r \) value of .32 (treatment control) to .63 (emotional response), \( p \) values <0.001), predicative and discriminate validity (Broadbent et al., 2006).
2.5.5 The General Health Questionnaire 30

The General Health Questionnaire-30 (GHQ-30, Goldberg & Hillier, 1972), which can be viewed in Appendix 8, was designed as a self-administered questionnaire to detect undifferentiated emotional distress in community settings rather than psychiatric populations (Nicholson et al., 2005). It acts as a screening instrument for minor psychiatric disorder, especially anxiety and depressive illness (ibid). Questions ask whether a range of symptoms have recently been worse or better than usual. The GHQ-30 was prepared from the full 60 item version using the best discriminators for psychiatric caseness, but removing somatic items, making it especially useful in research in clinical health populations.

In the GHQ-30, the four response categories of the positively worded items are labelled “better than usual/more so than usual”, “same as usual”, “less than usual”, and “much than usual”, whereas response categories for the negatively worded items are “not at all”, “no more than usual”, “more than usual”, and “much more than usual”. Each GHQ item was scored with a Likert format where subject’s responses can take a value of 0 to 3. From this a summary score was calculated, ranging from 0 to 90, which was used in the final analysis.

The factor structure of the GHQ-30 has been extensively investigated. There are five robust factors in the GHQ-30 corresponding to symptoms of anxiety, feelings of incompetence, depression, difficulty in coping and social dysfunction (Huppert & Garcia, 1991). Five subscales can be derived by summing participant’s scores on each item that contributed to a particular factor, based on the factor structure as outlined by Huppert et al., (1989) (Appendix 9), for example the depression subscale of the GHQ-30 can be calculated using items 24, 25, 26, 29, 30 (ibid).

2.6 PROCEDURE

2.6.1 RECRUITMENT

Participants were recruited from a centre for neuroinflammatory diseases covering a large geographical area in South Wales. Recruitment was planned to occur in two waves, by postal methods of data collection, and during client’s clinic appointments. This second
strategy, accessing potential participants at clinic, would only be employed if there was a low return rate from the first sampling strategy, postal methods.

A list of clients was generated at the centre for neuroinflammatory diseases. In accordance with the terms of the ethics approval and data protection guidelines, a member of the neurological diseases centre was responsible for sending potential participants a letter of invitation authored by the clinical psychologist in the service (Appendix 10), the information sheet (Appendix 11), the consent form (Appendix 12), the questionnaire battery (Appendix 4-8), and a stamped addressed envelope for returns.

A total of 800 potential participants were identified to be sent the research packs by the clinical supervisor at the neurological department. It was ensured that all participants had a confirmed diagnosis of MS before including them in the study, and that also these participants were alive (by cross referencing with the existing patient management system of the health board). This process reduced the potential sample to 399 participants who were sent an invitation letter, information sheet, consent form and the five questionnaires.

The questionnaire battery was coded for each participant. Each code would enable accessing demographic information (e.g. EDSS score) if participants did not want, or could not provide this. Participants were made aware that their patient files would be accessed if they did not provide this information, and consent was gained for this action.

A total of 117 participants responded to this phase of data collection; a response rate of 29%. In order to ensure an adequate sample size a second sampling strategy was employed. Research packs (including the invitation letter, information sheet, consent form, five questionnaires, and stamped addressed envelope) were provided to the multidisciplinary team, who would ask patients at their inpatient appointment whether they would be interested in partaking in the research. The team ensured that patients had not been previously approached about this research. This second stage of sampling generated a further 10 participants for inclusion in the study. Thus the two sampling strategies generated a potential sample of 127 participants. However on inspection six participants had returned the research pack unanswered, and so the final sample consisted of 121 participants.
2.7 ETHICAL CONSIDERATIONS

The main ethical considerations have been adequately addressed by the research and discussed in clinical supervision and with the ethics panel at review. Although it was deemed that this study did not pose a great risk to potential participants the following areas of ethical practice were considered in the design of this study. Voluntary participation, gaining informed consent, anonymity and the provision of contact details for further questions or concerns (emotional or with the research design itself) are considerations which have been addressed.

Information sheets were provided alongside consent forms to be read prior to deciding on consent. The voluntary nature of participation in the study was clearly outlined in the information sheet (see patient information sheet in Appendix 11), and that declining to take part would not affect their care in any way. In addition to the information sheet the consent form (see Appendix 12) reminded participants that participation was voluntary and that declining to take part would not affect their care in any way. The consent form also specifically asked potential participants to highlight that they had read and understood the information sheet, understood that participation was voluntary, that data would be treated anonymously and that they would not be identified in any report of the research project, and finally that their file would be accessed to gain demographic information (such as type of MS) if they did not or were not able to provide it.

In order to protect the confidentiality and anonymity of the participants each participant was assigned an identification number. Each of the measures sent to potential participants used this identification number so that no identifying information needed to be attached to any of their questionnaire responses. All participant information, consent forms and questionnaires were stored in a locked filing cabinet within Cardiff and Vale UHB premises.

Due to the nature of this research question and the measures used, which require participants to reflect on their mood and wellbeing, it was considered possible that some individuals might become distressed as a result of taking part in the study. This was highlighted to participants in the information sheet, and participants were advised that they could refuse to answer questions they found upsetting, and could withdraw from the study at any point of completion. While all of the questionnaires used have been established in
the literature and have not been reported to cause adverse experiences or distress, in order to address any concerns potential participants may have had, the researcher also provided phone and e-mail details to answer any questions that prospective participants had.

2.8 ETHICAL APPROVAL

Authorisation to conduct the research was obtained through application to the NHS Research and Development Department of the Local Health Board. After reviewing the proposal, this committee granted approval for the study to be completed (see Appendix 13 & 14), Approval was also granted from the Local Research Ethics committee (see Appendix 15).
CHAPTER THREE: RESULTS:

3.1 INTRODUCTION

This chapter will describe the results that have been garnered for this research project. After providing descriptive statistics for the sample and measures used, the chapter outlines how missing values were handled. The chapter next outlines how the data met the assumptions for conducting path analysis using multiple regression analysis. This includes considering normality and data transformation and includes tests of multivariate assumptions including multicollinearity, independent errors, linearity and homoscedacity. The chapter then goes on to test the main hypotheses.

3.2 DESCRIPTIVE DATA

3.2.1 PARTICIPANTS

Data were collected from 121 participants, 98 of whom were female and 23 male. All demographic information collected can be viewed in Table 3.1 below. Information in the table has been rounded up to the nearest whole number.

The age range of participants was 21 to 87 years, and the mean age was 46.92 (SD=12.74). Participants reported experiencing the symptoms of MS for a mean of 12.82 (SD=11.02) years before receiving a diagnosis, ranging between 1 and 59 years. Participants also reported that they had received a diagnosis ranging between 0 and 43 years ago (prior to participation in study), with the mean being 8.76 years (SD 8.54).

On the self report measures 23% reported that they did not know what type of MS they had. As such only these participants medical files were accessed (N=28) to ascertain their type of MS diagnosis, although due to incomplete records, for these 28 participants, this was only possible for 24 participants. Therefore, using both self report and checking patient files, the type of MS for each participant was only known for 117 of the total sample.
53% of the participants reported having relapsing remitting MS, 27% reported having secondary progressive MS, 14% reported having primary progressive MS, while 7% reported having benign MS.

**Table 3.1: Characteristics of participants in the study**

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean (SD)</th>
<th>Median</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>121</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>23</td>
<td></td>
<td></td>
<td>19%</td>
</tr>
<tr>
<td>Female</td>
<td>98</td>
<td></td>
<td></td>
<td>81%</td>
</tr>
<tr>
<td>Age</td>
<td>121</td>
<td>47 (13)</td>
<td>46</td>
<td></td>
</tr>
<tr>
<td>Length of symptoms before diagnosis</td>
<td>121</td>
<td>13 (11)</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>No of years since diagnosis</td>
<td>121</td>
<td>9 (9)</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Type of MS</td>
<td>117</td>
<td></td>
<td></td>
<td>97%</td>
</tr>
<tr>
<td>Relapsing remitting</td>
<td>62</td>
<td></td>
<td></td>
<td>51%</td>
</tr>
<tr>
<td>Benign</td>
<td>07</td>
<td></td>
<td></td>
<td>6%</td>
</tr>
<tr>
<td>Secondary progress.</td>
<td>32</td>
<td></td>
<td></td>
<td>26%</td>
</tr>
<tr>
<td>Primary progress</td>
<td>16</td>
<td></td>
<td></td>
<td>13%</td>
</tr>
</tbody>
</table>

### 3.2.2 MEASURES

Descriptive data for the four variables, the EDSS, the BIPQ, the AAQ-II and the GHQ-30 are included in Table 3.2. The mean scores, standard deviations, and minimum and maximum scores obtained from the sample are presented for each variable. The possible range of scores that could be obtained on each of the measures is also included. It should be noted that the data presented in these tables is the untransformed data to enhance clarity.
Table 3.2: Descriptive data for EDSS, AAQ-II, BIPQ and GHQ-30.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Minimum Score</th>
<th>Maximum Score</th>
<th>Range of measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expanded Disability Status Scale (EDSS)</td>
<td>4.75</td>
<td>1.96</td>
<td>2.18</td>
<td>8</td>
<td>2.18-8</td>
</tr>
<tr>
<td>Acceptance and Action Questionnaire (AAQ-II)</td>
<td>19.41</td>
<td>10.9</td>
<td>7</td>
<td>49</td>
<td>7-49</td>
</tr>
<tr>
<td>Brief Illness Perception Questionnaire (BIPQ)</td>
<td>45.63</td>
<td>13.15</td>
<td>11</td>
<td>75</td>
<td>0-80</td>
</tr>
<tr>
<td>The General Health Questionnaire (GHQ-30)</td>
<td>32.65</td>
<td>16.88</td>
<td>7.15</td>
<td>84.38</td>
<td>0-90</td>
</tr>
</tbody>
</table>

Table 3.3 provides a breakdown of the mean, median and mode for each of the separate items on the BIPQ. The participants in this study rated timeline as the most negative representation of MS (M=9), while the least negative was their emotional concern about MS (3).

Table 3.3: Mean, median and mode for each of the items on the BIPQ

<table>
<thead>
<tr>
<th>BIPQ item</th>
<th>Mean</th>
<th>Median</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consequences</td>
<td>5.4</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Timeline</td>
<td>8.9</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Personal Control</td>
<td>6.1</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Treatment Control</td>
<td>5.5</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Identity</td>
<td>5.5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Coherence</td>
<td>5.7</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Emotional Concern</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Illness Concern</td>
<td>5.6</td>
<td>6</td>
<td>8</td>
</tr>
</tbody>
</table>
3.3 STATISTICAL ANALYSIS

Data were analysed using the Statistical Package for the Social Sciences (SPSS, Versions 16 and 19 for Windows and Mac, respectively).

3.4 DATA SCREENING

3.4.1 MISSING DATA IMPUTATION

The GHQ recommends treating incomplete answers as low scores, and so this procedure was followed when creating the dataset. Beyond this, the complete dataset was screened for missing values, and the following section outlines how missing values were handled.

Missing Values Analysis (MVA) was conducted on the resulting dataset (N=121), which showed that less than 5% of the data was missing across the study variables. Tabachnick and Fidell (2009) have stated that if 5% or less data points are missing in a random pattern from a data set almost any procedure for handling missing values yields similar results.

Data were largely missing at random (MAR) as is the case in most social science research (Acock, 2005). Although Little’s MCAR statistic was significant, indicating that the data were not completely missing at random, further investigation illustrated that there was no systematic pattern to the missingness, and so it can be assumed that the data were MAR.

Missing data were imputed using Expected Maximisation (EM) in SPSS. This approach assumes the missing data meets MAR assumptions and uses an iterative procedure to create a single data set with no missing values. This process is based on observed relationships between variables and produces a less biased estimate of parameters when the data is MAR than deletion methods or other forms of single imputation such as mean substitution (Fox-Wasylshyn & El-Masri, 2005).

3.4.2 OUTLIERS

Extreme values analysis, on SPSS, was used to check for outliers, and indicated the presence of 1 outlier on the AAQ-II (a score of 49), and 6 outliers on the GHQ-30 (ranging
from 73-84). Data had been accurately entered into the database, and these scores are within the range expected of the measures used. Inspection of these scores also indicated that these extreme scores were representative of the participants scores on other measures (i.e. they also scored highly on other measures) and so these outliers were not considered suitable for deletion, as they are considered to be sampled from the target population.

3.5 TESTS OF MULTIVARIATE ASSUMPTIONS

The path analysis was carried out in two phases: assumption testing and path estimates. In order to draw conclusions about a population based on a regression analysis done on a sample, several assumptions must be met (Field, 2009). When the assumptions of regression are met, the model for a sample can be accurately applied to the population of interest with some confidence (ibid). The assumptions that must be met include normally distributed data, no perfect multicollinaerity, homoscedasticity, independent errors, and linearity, and these are discussed below. The procedures to examine these assumptions followed the guidance provided by Field (2009) and by (Tabachnick & Fidell, 2007).

3.5.1 NORMALITY

The statistics employed require assumptions of normality to be met and therefore normality of the variables was assessed through examination of histograms and also using the Kolmogorov-Smirnov statistical test (K-S test) (Appendix 16). The K-S test revealed that two of the predictors variables (the EDSS scores and the AAQ-II scores) and the outcome variable (GHQ-30) were non-normally distributed ($p<0.05$).

Field (2009) recommends analyzing normality by analyzing the skewness and kurtosis of the data, in addition to using the K-S statistic, to make a more informed decision about the normality of data. In order to standardise the reported values for skewness and kurtosis (Appendix 17), they were converted into z-scores by subtracting the mean of the distribution (in this case 0) and then divided by the standard error of skewness or kurtosis, as recommended by Field (ibid).
Field (2009) suggests that z-scores greater than 1.96 for both skewness and kurtosis should be considered significant at the \( p<0.05 \) level, greater than 2.58, significant at the \( p<0.01 \) level, and scores greater than 3.29, significant at the \( p<0.001 \) level.

An analysis of skewness and kurtosis indicated that the EDSS scores were not significantly skewed (\( z=1.1689 \)), however they were significantly negatively kurtotic (\( z=3.30, p<0.001 \)). Consonant with the K-S test, the AAQ-II (\( z=3.5286 \)), and the GHQ-30 (\( z=5.5479 \)) were both found to be skewed at the \( p<0.001 \) level, indicating significant positive skewness. The AAQ-II was not significantly kurtotic (\( z=0.767 \)), however the GHQ was significantly positively kurtotic (\( z=2.89, p<0.01 \)).

### 3.5.2 DATA TRANSFORMATION

Field (2009) recommends data transformations to correct problems with normality, but can also reduce the impact of outliers (Tabachnick & Fidell, 2007). Relationships between scores are not altered as a result of data transformation, since the same transformation is applied to each of the values in a given variable (Field, 2009).

The three most common types of data transformation are log transformation, square root transformation and reciprocal transformation. Log transformation is useful to reduce positive skew, as taking the logarithm of a set of numbers compresses the right tail of the distribution more than the left (Field, 2009). Square root transformations are also a useful way to reduce positive skew by taking the square root of each score. By transforming data in this way, large scores are brought closer to the centre of the distribution (ibid). Reciprocal transformation involves dividing 1 by each score, which effectively reverses scores, so that what were large values originally, become small values after transformation, and vice versa (Field, 2009).

Log, square root and reciprocal transformations were carried out on the three variables found to have a non-normal distribution (the EDSS, AAQ-II and GHQ-30). Log transformations resulted in the best improvements to normality; the AAQ-II and GHQ-30 were no longer significantly skewed (\( p>0.05 \)), and the log transformation also reduced the impact of the negative kurtosis on the GHQ-30 (\( p>0.05 \)).
Log transformation did not address the level of kurtosis in the EDSS, however Allison (1999) states that the assumption of normality is the least important of all assumptions in multiple regression, and given a moderate sample size can be dispensed with entirely. Arbukle (1997, p 239) also states that “a departure from normality that is big enough to be significant could still be small enough to be harmless”. Given the adequate sample size of 121 it is considered that the data would be robust enough to this violation of assumption. However, given that the log transformation in this study produced significant improvements in the normality of two variables, it was decided that the transformed data, for each of the three non-normally distributed variables, would be reported in the statistical analysis.

### 3.5.3 MULTICOLLINEARITY

Multicollinearity exists when there is a strong correlation between two or more predictors in a regression model (Field, 2009). Multicollinearity poses a problem because when highly correlated variables are included in the same analysis there is much redundancy in the statistical analysis; multicollinearity suggests that two variables measure essentially the same thing (ibid).

There was no evidence of the presence of multicollinearity amongst the variables. This assumption was validated by the Variance Inflation Factor (VIF) values (the recommended guidance is below ten) and tolerance values (tolerance below 0.2 indicates a potential problem) (Field, 2009). The average VIF values were all well below ten, and tolerance statistics all well above 0.2, confirming that multicollinearity was not considered a problem (Field, 2009). Also, in terms of multicollinearity there were no substantial ($r > .9$) correlations between variables (Field, 2009) (these correlations can be seen in Table 3.4).

### 3.5.4 INDEPENDENT ERRORS

For any two observations the residual terms (prediction errors from a regression analysis) should be uncorrelated (Field, 2009). To check whether the residuals in the model are independent the Durbin-Watson statistic for autocorrelation, which tests for serial correlations between errors (whether adjacent errors are correlated) (Field, 2009) was used. A value of two suggests that the residuals are uncorrelated; a value below two indicates a positive correlation, a value above two indicates a negative correlation. In this
case the values were all close to two (1.67-2.25), indicating that the assumption of independent errors was met.

3.5.5 LINEARITY AND HOMOSCEDACITY

In regression it is assumed that the relationship being modeled is a linear one (Field, 2009), and as such linearity was assessed through examination of scatterplots for each pair of variables when the multiple regression analysis was run. As recommended by Field (2009) plots for *ZRESID against *ZPRED, a histogram and normal probability plots of the residuals was requested when running the regression analyses. Also, Tabachnick and Fidell (2007) recommend that if scatterplots appear oval-shaped or near oval-shaped, then it can be assumed that they are linear and homoscedastic. As can be seen in the plots (Appendixes 18 and 19), there was no evidence of the graphs funneling out, indicating that heteroscedasticity was not an issue (Field, 2009). Also there were no curves in the data, indicating that the assumption of linearity had been met (ibid).

3.5.6 SUMMARY

The first stage of the path analysis: assumption testing has indicated that the data were suitable for estimating the path coefficients through use of multiple regression analysis. The previous section highlighted that missing values were imputed using expected maximization in SPSS. To address that three of the variables, the EDSS, the AAQ-II, and the GHQ-30 were not normally distributed, log transformations were completed. Finally further tests such as the Durbin-Watson statistic, the Variance Inflation Factor (VIF) values, and examining scatterplots indicated that there were no problems arising from linearity, homoscedacity, multicollinearity and independent errors, and that the data were suitable for tests of multivariate statistics.

The next section outlines the process of estimating the path coefficients. Before this, establishing that there is a relationship between the variables of interest in the study will be assessed through bivariate correlations.
3.6 BIVARIATE CORRELATIONS

Hypotheses 1 to 3 were investigated using Pearson product moment correlations. Table 3.4 presents a correlation matrix, with Pearson correlation coefficients (r) reported for each pair of variables, along with significance levels. In these and all further statistical analyses, the log transformed data for the variables EDSS, AAQ-II, and GHQ-30 have been used.

Table 3.4: Correlation matrix of variables EDSS, BIPQ, AAQ-II, GHQ-30 and the depression subscale from the GHQ-30.

<table>
<thead>
<tr>
<th>Variable</th>
<th>EDSS</th>
<th>BIPQ</th>
<th>AAQ-II</th>
<th>GHQ-30</th>
<th>GHQ-Depression</th>
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<td>GHQ-Depression</td>
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Hypothesis 1: There will be a positive relationship between physical symptoms and psychological distress

Table 3.4 shows that a significant positive relationship exists between the EDSS scores and the GHQ-30 (r=0.29, p (one tailed) <0.01), therefore hypothesis 1 is supported.

Hypothesis 2: There will be a positive relationship between illness representations and psychological distress

As can be seen from table 3.4, a significant positive relationship exists between the BIPQ and the GHQ-30 (r=.70, p (one tailed) <0.01), and therefore hypothesis two is supported.
Hypothesis 3: There will be a positive relationship between experiential avoidance and psychological distress

Examination of Table 3.4 indicates that when investigating the relationship between the AAQ-II and the GHQ-30, hypothesis 3 is supported as the data shows a significant positive relationship exists \((r=.67, p\text{ (one tailed)} <0.01)\).

### 3.7 PATH ANALYSIS

Path analysis using a series of simultaneous regression analyses (Appendix 18-19) in SPSS was used to test hypotheses 4, 5 and 6. Hypothesis 4 stated that EA would mediate between disability and distress, hypothesis 5 stated that EA would mediate between illness representations and distress, and hypothesis 6 stated that illness representations would mediate between disability and distress.

Figure 3.1 shows the path model used to assess hypotheses 4, 5 and 6. The path coefficients along each pathway are the standardised beta coefficients obtained from the multiple regression analyses (Appendix 18-19). A regression was not necessary to obtain the path between level of physical symptoms (EDSS) and illness representations (BIPQ), but in the path model is represented by the bivariate correlation (Klem, 1995).

The path coefficients represent the strength of the relationship between each pair of variables. Direct effects are shown in the path diagram by straight arrows from one variable to another (Klem, 1995). Statistical significance of each of the path coefficients is indicated by use of asterisks.

Error terms (E) were also determined for each regression analysis within the path model, and these were calculated by taking the variance of the errors \((1-R^2)\) from the regression equation for the corresponding dependent variable (Bryman & Cramer, 1990, Klem, 1995). Error terms provide an indication of the success of the model, as they represent how much variance within the model remains unexplained (Klem, 1995) after the regression analyses have been carried out.

Also, in path analysis, the indirect pathways between variables are of interest. Indirect effects involve chains of straight arrows, where the path along the arrows is always
forward, and in the direction of the arrow (ibid). Klem (1995) highlights that in order to estimate the magnitude of an indirect effect of one variable on another, you must locate all the routes, and for each route multiply the path coefficients to obtain their product, and (if necessary) then add the products to get their direct effect.

Hypotheses 4 and 5 predicted that EA would act as a mediator variable within the model. Hypothesis 6 proposes that illness representations would act as a mediator variable within the model. Frazier et al. (2004) describe a mediator as a variable that explains the relation between a predictor and an outcome, and so it influences the outcome variable. Therefore to examine hypotheses 4 to 6, the strength of the indirect pathways through EA were calculated and compared to the strength of direct relationships within the model.

**Hypothesis 4: The relationship between physical symptoms (EDSS) and psychological distress (GHQ-30) will be mediated by experiential avoidance (AAQ-II).**

In order to assess support for this hypothesis, the strength of the direct pathway between physical symptoms and psychological distress was compared to the indirect pathway via EA. Klem (1995) advises calculating this indirect pathway by multiplying the path coefficient between physical symptoms and EA (-.17) by the path coefficient between EA and psychological distress (.42). Thus the strength of this pathway was calculated as -.07. The direct pathway between physical symptoms and EA and psychological distress is -.09. Therefore the hypothesis that EA mediates the relationship between physical symptoms and psychological distress is not supported by this data, since the strength of the direct pathway is greater than the strength of the indirect pathway. Also, the direct pathway between disability and distress is not significant, indicating that there is no relationship for EA to mediate.
Figure 3.1: Path diagram of the relationships between level of symptoms, illness beliefs, experiential avoidance, and psychological distress, showing path coefficients and error terms.
Hypothesis 5: The relationship between illness representations and psychological distress will be mediated by experiential avoidance

The strength of the direct pathway between illness representations and psychological distress was compared to the indirect pathway through EA. The indirect pathway was calculated by multiplying the path coefficient between illness beliefs and EA (.62), and the path coefficient between EA and psychological distress (.42). Thus the strength of the indirect pathway was calculated as .26. The strength of the direct pathway between illness beliefs and psychological distress is .53. Therefore the hypothesis that EA mediates the relationship between illness beliefs and psychological distress is not supported by the data, since the direct pathway is greater than the strength of the indirect pathway.

Hypothesis 6: The relationship between physical symptoms and distress will be mediated by illness representations.

The strength of the direct pathway between physical symptoms and psychological distress was compared to the indirect pathway via illness representations. The indirect pathway was calculated by multiplying the path coefficient between symptoms and distress (.57) and the path coefficient between illness representations and distress (.53). The strength of this indirect pathway was calculated as .30. The strength of the direct pathway is -.09. Therefore the hypothesis that illness representations mediate the relationship between physical symptoms and distress is supported. However, the direct pathway between disability and distress is not significant, indicating that there is no relationship for EA to mediate, and therefore this hypothesis was rejected.

3.7.1 SUCCESS OF THE PSYCHOLOGICAL DISTRESS PATH MODEL

By examining the error variance within the path model, the overall success of the model can be assessed. As outlined previously, error terms provide an indication of how much variance within the variables remains unexplained by the hypothesised relationships in the model (Bramwell, 1996). The error term may represent different types of error arising from measurement or general model error, such as omission of relevant variables or incorrect ordering of factors within the model (ibid). Bramwell (1996) suggests that error variance can be considered high if it is above .80.
Figure 3.1 highlights two error terms (AAQ-II & GHQ-30), both below .80. The error term is lowest for the regression analysis of physical symptoms, illness beliefs, EA and distress (.38). This indicates that these three variables can be considered to account for 62% of the variance in distress within this sample.

3.8 PSYCHOLOGICAL DISTRESS CONCEPTUALISED AS DEPRESSION

Given the amount of research that has been devoted to depression as the main measure of psychological distress in the literature, the results also consider depression as an outcome measure, using the depression subscale from the GHQ-30. This model is not presented as an alternative model to the psychological distress model, but to investigate the impact of conceptualising distress as depression. As such, the same 6 hypotheses are used to investigate the relationship between disability, EA, illness representations and distress, but conceptualised as depression.

The depression subscale, like the GHQ-30, was not normally distributed according to the K-S test ($p<0.05$), and was found to be positive skewed ($z=5.39$, $p<0.001$), but not kurtotic ($z=1.61$). As such, it was also transformed using log transformation, which addressed the problems with normality.

Hypotheses 1 to 3 were investigated using Pearson product moment correlations, which were presented in table 3.4. As can be seen from Table 3.4 significant positive correlations exist between EDSS scores and depression ($r=.24$, $p$ (one tailed) $<0.01$), between illness representations and depression ($r=.60$, $p$ (one tailed) $<0.01$), and between EA and depression ($r=.65$, $p$ (one tailed) $<0.01$). These correlations indicate that hypotheses 1 to 3 are supported when conceptualising distress as depression.

Figure 3.2 shows the path model used to assess hypothesis 4, 5 and 6, when conceptualising distress as depression. As previously discussed, the path coefficients along each pathway are the standardised beta coefficients contained from the multiple regression analysis. Only one new regression was needed to calculate the path coefficients for this model (Appendix 20). The coefficients indicate the strengths of the relationships between each of the variables, with statistical significance being indicated by use of an asterisk. Error terms were determined within the path model by taking the
To examine hypotheses 4 to 6, conceptualising distress as depression, the strength of the indirect pathways through EA were calculated and compared to the strength of the direct relationships within the model.

Hypothesis 4: *The relationship between physical symptoms and depression will be mediated by experiential avoidance:*

The strength of the direct pathway between physical symptoms and depression was compared to the indirect pathway via EA. The indirect pathway was calculated by multiplying the path coefficient between physical symptoms (EDSS) and EA (AAQ-II) (-.17), by the coefficient between EA and depression (.46). Thus, the strength of the indirect pathway was calculated as -0.08. The strength of the direct pathway between physical symptoms and depression is -0.05. Therefore the hypothesis that EA mediates the relationship between level of physical symptoms and depression is supported by the data. However, as the path model shows, there is no significant relationship between physical symptoms and depression, and so this hypothesis that EA acts as a mediating variable between physical symptoms and depression is rejected, as the model indicates that there is no relationship to mediate.
Figure 3.2: Path diagram of the relationships between level of symptoms, illness beliefs, experiential avoidance, and depression, showing path coefficients and error terms.
Hypothesis 5: The relationship between illness representations and depression will be mediated by experiential avoidance:

To assess support for this hypothesis, the strength of the direct pathway between illness representations and depression was compared to the indirect pathway via EA. The indirect pathway was calculated by multiplying the path coefficient between illness representations and EA (.62), and the path coefficient between EA and depression (.46). This indicated that the strength of the indirect pathway was .29. The strength of the direct pathway between illness representations and depression is .39. Therefore the hypothesis that EA mediates the relationship between illness representations and depression is not supported as the strength of the direct pathway is greater than the strength of the indirect pathway.

Hypothesis 6: Illness representations will mediate the relationship between physical symptoms and depression.

In order to test this hypothesis, the strength of the direct pathway between EDSS scores and depression was compared to the indirect pathway through illness representations. The indirect pathway was calculated by multiplying the path coefficient between physical symptoms and illness representations (.57), and the path coefficient between illness representations and depression (.39). Thus the strength of the indirect pathway was calculated as .22. The strength of the direct pathway between physical symptoms and depression is -.05. Therefore the hypothesis that illness representations mediate the relationship between level of physical symptoms and depression is supported by the data. However, as in Hypothesis 4, the path model shows that there is no significant relationship between physical symptoms and depression, and so this hypothesis, that illness representations acts as a mediating variable between physical symptoms and depression is rejected, as the model indicates that there is no relationship to mediate.
CHAPTER FOUR: DISCUSSION:

4.1 OVERVIEW

This chapter will reflect on how the results obtained during this study contribute to theory and knowledge about psychological distress in Multiple Sclerosis (MS). The results will be discussed with reference to current literature. Before discussing the clinical implications of the research, the strengths and limitations of the study will be considered. In addition recommendations for future research will be outlined.

4.2 SUMMARY AND INTERPRETATION OF THE FINDINGS

The aim of the present study was to explore factors associated with psychological distress in a sample of participants with MS. The factors explored were level of disability as measured by the EDSS, illness representations and EA. As one of the limitations of the literature on psychological wellbeing in MS to date has been that psychological distress has mainly been conceptualised as depression, this study looked at a broader conceptualization of psychological distress, using the 30 item General Health Questionnaire (GHQ-30) as the outcome measure. The association with each of these factors on psychological distress, and the inter-relationships between them were examined using path analysis. Path analysis allowed the explicit display of hypothesised relationships that were expected to occur. In addition, due to the amount of literature that exists in relation to rates of depression in MS populations, the variables under study were also investigated when conceptualizing distress as depression, to highlight any differences that might occur in the results.

Pearson product moment correlations showed that there were significant positive correlations between all four of the variables under study: level of physical symptoms (EDSS), illness representations (BIPQ), EA (AAQ-II), and psychological distress (GHQ-30). Each of the variables were positively scored, with high scores indicating higher rates of disability, higher illness representations (negativity of individuals illness representations), EA (as opposed to acceptance), and increased levels of psychological distress. The significant positive correlations indicate that a high score on any of the variables of interest is likely to be associated with a high score on another of the variables of interest.
The current study hypothesised that level of physical symptoms, illness representations and EA would all be associated with increased psychological distress. The significant, positive correlations found between variables therefore provide support for each of these first three hypotheses.

Indirect and direct relationships between all four variables were tested using the method of path analysis. A model of the hypothesised relationships was presented and then tested as to its goodness of fit with the data, by examining the error terms (amount of variance left unexplained in the model). The model presented was based on theory and research findings. This study hypothesised that there would be indirect effects within the data; that EA would mediate between level of physical symptoms (EDSS) and distress, and between illness representations and distress. However as will be discussed below, the data demonstrated a number of significant direct relationships between the variables, and there was little evidence to support the hypothesised indirect relationships.

4.2.1 THE PSYCHOLOGICAL DISTRESS MODEL

Overall the model was considered to be relatively successful in accounting for variance in predicting distress, as indicated by the error terms. Specifically the three variables: level of symptoms (EDSS), illness representations (BIPQ) and EA (AAQ-II) were found to account for a significant proportion of the variance in psychological distress (62%). This suggests that the model was successful in highlighting three important variables in explaining distress amongst individuals with MS. It should be noted that, two of the paths; the path from the EDSS scores to EA and the path from EDSS scores to distress, have negative values, and, as they were not significant, indicate no relationship with the outcome variables of interest. This is of note as the bivariate correlation indicated a significant positive correlation (e.g. \( r = .29, p < 0.01 \) between EDSS scores and GHQ-30 scores).

If the beta coefficients of these two aforementioned paths were positive they would suggest that the model is not plausible (Duffy, 1991), because two of the hypothesised relationships fail to meet one of the conditions for a casual relationship; covariance (ibid). However, the model was not rejected based on these grounds, as it is believed that these negative values indicate suppressor effects.
If variables are positively correlated (bivariate correlations), then develop a negative regression weight after inclusion in a regression equation, then it is likely that one of the variables is a suppressor (Massen & Bakker, 2001). As defined by Pedhazur (1982, p. 104) “a possible suppressor variable is a [predictor] variable that has a zero, or close to zero correlation with the criterion (outcome or dependent variable) but is correlated with one or more than one of the predictor variables”.

It would seem that the EDSS variable may be the suppressor variable, in that, it has no relation to the outcome variables within regression: psychological distress or EA, but it has a strong relationship to illness representations (they would not exist without the physical symptoms/illness). Suppressors improve prediction indirectly by making other predictors better; they make the $R^2$ effect size larger, even though the suppressor has little or no correlation with the dependent variable (Thompson, 2006). For example, post hoc analysis (Appendix 21) showed that omitting the EDSS variable, and regressing psychological distress on illness representations and EA, did not change the $R^2$ value, but did change the standardised beta coefficient, presented in the results section, from .53 to .47 for the path from illness representations to psychological distress. This path was significant at $p<0.001$. These post hoc analyses provide support to suggest that the EDSS variable may have been causing suppressor effects, and as such the model is regarded as plausible.

The strongest direct pathway to distress was from illness representations. This suggests that illness beliefs may have a central role in predicting psychological distress in individuals with MS, which is consistent with the findings from previous research (Vaughan et al., 2003; Jopson and Moss-Morris, 2003). There was also a strong relationship between illness representations and EA, suggesting that the more negative a participant’s illness representation, the more EA was employed by participants. There was also a strong positive relationship between EA and psychological distress, however illness representations alone had a more direct influence on distress than did EA, and explained more of the unique variance in distress. Therefore, it appears that when participants with MS hold more negative illness representations (high BIPQ summary scores) they engage more with EA (i.e avoiding thoughts about the illness).

The current study hypothesised that EA would act as a mediator between level of physical symptoms and distress, and between illness representations and distress. A mediator variable is one that accounts for a relationship between a predictor and an outcome, and
so it rests on the assumption that there must be a relationship to mediate (Frazier et al., 2004). Thus within the proposed model, the indirect pathways through EA were hypothesised to be more strongly associated with distress than the direct pathways between level of physical symptoms and distress, and/or between illness representations and distress.

Findings did not support the hypothesised role of EA as a mediator between physical symptoms and psychological distress. However since the direct pathway from physical symptoms to level of distress did not highlight a statistically significant relationship to mediate, this is not a surprising finding.

Findings did not support the hypothesised role of EA as a mediator between illness representations and psychological distress. The direct relationship between illness representations and distress was found to be stronger than the indirect relationship via EA. Therefore, data suggests that illness representations is best conceptualised as providing a direct contribution to variation in distress within this population, as well as being a predictor of greater EA. Illness representations are said to be directly related to coping, and via coping to outcomes (Vaughan et al., 2003). As highlighted by Karekla and Panayiotou (2011) coping styles and EA are largely overlapping but not identical constructs. The findings of this research suggest that illness representations may be better predictors of outcome than coping or related constructs (EA), which is in keeping with previous findings (Moss-Morris et al., 1996).

Findings partially supported the hypothesis that illness representations would mediate the relationship between the level of physical symptoms and distress. However the strength of the direct path from illness representations to distress was stronger than the indirect pathway from level of symptoms through illness representations to distress. As has been discussed earlier, the EDSS path to psychological distress was not significant, indicating no relationship to psychological distress; however it may have acted as a suppressor variable. As such this may suggest that illness representations are a moderator (under what conditions) rather than a mediator.
4.2.2 DISTRESS CONCEPTUALISED AS DEPRESSION

Given the amount of research that has been conducted within this population about depression, the depression subscale of the GHQ-30 was used to run a secondary analysis, using the same six hypotheses. As such, it was hypothesised that level of physical symptoms, illness representations and EA would be associated with increased depression. Again, support for each of these three hypotheses was found by the significant positive correlations between EDSS scores, BIPQ scores, EA scores and the depression subscale of the GHQ-30.

When conceptualizing distress as depression, similar findings were highlighted. Again, the two paths from level of physical symptoms (EDSS) to EA and from level of physical symptoms to depression have negative values; which at face value indicates that an increase in disability equates to a decrease in EA and a decrease in depression. However, given that the bivariate correlations between the level of physical symptoms and both EA and depression were both positive, this negative relationship is again considered to be an example of a suppression effect caused by the EDSS scores.

The strongest direct pathway to depression was from EA, which is a different finding when distress is conceptualised in a broader sense (using the GHQ-30), which indicated that illness representations were a stronger predictor of psychological distress. This suggests that for depression in MS populations, EA may have a central role, although further research is required. Illness representations also had a significant relationship to depression, but did not account for as much variance as EA did.

The findings did not support the hypothesised role of EA as a mediator between either level of physical symptoms or illness representations, and the direct pathways provided a greater contribution to the variance in depression within this population.

This model is only presented for exploratory purposes, to highlight that conceptualizing distress in different ways suggest different findings; and the relationship of the variables in relation to depression in MS requires much further research.
4.3 STRENGTHS AND LIMITATIONS OF THIS RESEARCH

4.3.1 STRENGTHS

One of the most important strengths of the present study is the empirical support it provides for what may account for the high rates of psychological distress in a UK MS sample. As such the findings of this study contribute to a psychological understanding of the complex pathways that can lead to psychological distress in this population. The objective of the current study was to further knowledge and understanding of the psychological factors associated with psychological distress in individuals who have MS. As has been suggested in this research the effects of MS on patient quality of life including mental health, has often been neglected, for example Foley and Brandes (2009) state that it is commonly neglected in MS assessment and clinical trial designs. The relationship of psychological distress with MS status is complex (Arnett et al., 2008) but the model presented in this study was shown to be relatively successful in accounting for the variance in distress (as measured by the GHQ-30) and the findings are considered an important addition to the knowledge base in this area.

Due to the limitations in psychometric properties in previous versions of the AAQ-I, it is a strength of the current study that it has used the most up to date version of the AAQ, the AAQ-II, which has shown to have good psychometric properties, and evidence states that it measures a single construct (Bond et al., 2011). Given that all of the research incorporated in the introduction (e.g. systematic review) used measures of EA with less than acceptable psychometric properties, this stands as a clear strength of the research.

Despite increasing attention within the empirical literature, research on EA can be regarded to be in its infancy, and so exploring the concept further, with sound psychometric measures, and with different populations is of significant theoretical interest. While EA has been shown to mediate between certain variables and outcomes, such as detached coping and depression (Costa & Pinto-Gouveia, 2011), passive coping and depression and anxiety (Fledderus et al., 2010), and between social anxiety and PTSD on quality of life (Kashdan et al. (2009), this study has highlighted that EA does not mediate between disability and distress, nor between illness representations and distress. Despite this, the research did indicate that there is a relationship between EA and depression in the MS populations, and so warrants further investigation.
Also, to date psychological distress has mostly been conceptualised as depression within the empirical literature, and so the use of the GHQ-30 which provides a broader measure of psychological health and wellbeing, is considered as a strength of the study. In addition, the GHQ-30 was able to provide a measure of depression, and so the research was able to conceptualise distress as depression, and to consider the implications of this. For example, given that the three variables: physical symptoms, illness representations and EA accounted for 62% of the variance of distress, but only 50% of the variance in depression, this analysis highlights that conceptualizing psychological distress only as depression is a limited view on the experience of distress in MS, and this should be addressed in future research and service provision.

The sample size in this study is also considered a strength of the research. Using estimates for multivariate statistics as outlined by Harris (1985) and Green (1991), it was estimated that the sample size would be between 53 and 107; sample sizes similar to those suggested by Cohen (1992) in order to detect a medium effect size (n=76), using three predictor variables. Thus the final sample size of 121 is considered to be a strength of the study, and reduces the probability of Type 2 errors (Lachin, 1981).

4.3.2 LIMITATIONS

Certain limitations of the study need to be noted. The limitations will be discussed in the areas of design, the use of self report measures, and sampling, and the implications of these limitations will be considered.

4.3.2.1 DESIGN

As the study is cross sectional the direction of relationships cannot be clarified. Further research using longitudinal designs would allow for investigation of the direction of the relationships between the variables in the model. Longitudinal research would also be better able to establish the nature of mediation relationships (Goldstone et al., 2011), and Hayes et al. (2006) argue that true mediation analysis requires longitudinal designs.

In addition, path analysis cannot establish the direction of causality (Stage et al., 2004). However, direction has been ascribed to the variables within the model on the basis of
theory, and as such the results provide support for the relationships expressed within the model. Future research on EA and illness representations in MS may provide a clearer account of the relationships and direction of these, for MS populations.

4.3.2.2 USE OF SELF REPORT MEASURES

All of the data for this study were collected through the use of self report measures. In addition, some of the self report measures used require further consideration.

Self report measures are now receiving increasing recognition as secondary outcome measures in MS research (Gold et al., 2003). As can be seen there was a range of disability experienced by the participants included in the study, from participants scoring two on the EDSS (minimal disability) to eight (essentially restricted to bed or chair, maintains many self care functions) on the EDSS (Kurtzke, 1983), and each of the types of MS were fairly well represented, with 39% of the sample representing the more severe forms of MS: secondary progressive (26%) and primary progressive (13%) types of MS. So one particular limitation of using self report measures in this population is that cognitive impairment associated with MS may have affected the response provided. Pakenham and Fleming (2011) found that participants with less cognitive impairment reported higher MSAQ action, suggesting that participant’s ability to engage in EA, or acceptance, might be affected by their cognitive functioning. The prevalence of cognitive impairment in MS is estimated to be between 54% and 65% across all stages of the disease (Amato et al., 2006). However as cognitive impairment was not assessed it cannot be accounted for in the responses provided and subsequent analysis. In addition, the role of cognitive impairment and its impact on cognitive flexibility requires further research.

As with all self report measures, the measures used, may be subject to various forms of response bias and/or socially desirable responding (van de Mortel, 2008). A social desirability scale could have been used to minimise the effect of this on the research, however a review of questionnaire based research studies listed on CINAHL between 2004-2005, found that of 14275 articles, only 31 used a social desirability scale (van de Mortel, 2008).
4.3.2.3 MEASURES USED

This study included an analysis of the relationships between the EDSS and three other variables: illness representations, EA and psychological distress as measured by the GHQ-30. The EDSS is a widely used measure within the literature, but has nonetheless attracted criticism.

The EDSS remains as the most widely used disability measure in clinical trials of MS (Hobart et al., 2000). While the EDSS has been described as the gold standard in MS research, it has also been called the “tarnished gold standard”, however all other available measures of disability in MS also have some limitations (Thompson & Hobart, 1998, p. 192). One of the main limitations of the EDSS for this study was that it is, in effect, an ordinal scale (McGuigan & Hutchinson, 2004). The EDSS was developed before the acceptance of psychometric methods of scale development and has a number of problems such as rater variability, poor reliability, insensitivity to change at certain levels (e.g the higher levels of disability), and too much emphasis on mobility status (ibid).

In most studies, the distribution of scores on the EDSS forms, similar to the distribution found in this study, a bimodal distribution with peaks in the lower and upper ranges and a trough in the middle (Hohol et al., 1995). However, the EDSS is a familiar and widely used measure and so it’s inclusion in the study is justified. However, it may have been more helpful to include another measure of disability and treat both measures as one latent variable, suitable for analyzing within SEM. However this may have been problematic given the sample size needed for SEM, which increases, as variables are added to the model (Cohen, 1992).

Previous research highlights that the EDSS correlates with depression using the BDI as a measure of depression (McIvor et al., 1984, Mohr et al., 1997; Pujol et al., 2000), however other research suggests that no relationship is apparent using the BDI (Minden et al., 1987; Beatty et al., 1990; Sabatini et al., 1996, Pujol et al., 1997). Thompson and Hobart, (1998) highlighted that EDSS scores have poor correlations with the GHQ-28 item version, and the GHQ-depression subscale (Rabins et al., 1986). Therefore it may have been erroneous to predict a relationship to occur between the EDSS and psychological distress. Despite this, bivariate correlations did provide support for a relationship between EDSS scores and distress (p<0.01), and the use of it in the path model indicated that EDSS
scores may act as a suppressor variable, increasing the prediction of other variables. As such, the use of the EDSS as a measure of physical symptoms added to the plausibility of the models presented here.

Conceptualizing distress as depression was used to compare how distress is conceptualised and how this might impact on results, rather than to compare the two models. While, when conceptualizing distress as depression, the results suggested that EA explains most of the variance, this finding requires replication using more robust measures of depression, rather than a subscale of a measure, as used in this study.

The BIPQ was chosen over the longer version of the IPQ for its brevity; and the composite score from the BIPQ was used to indicate the overall positivity or negativity of participant’s illness perceptions of MS. This approach; using the composite score, was about the strength of illness perceptions, rather than the content of illness perceptions. While this approach was meaningful in addressing the research question posed in this thesis, and consonant with similar research investigating the relationship between the concept of illness representations and other constructs, the significance of the content of illness representations has been lost to some extent by using the total score from the BIPQ. This issue will be addressed further when considering future research.

4.3.2.4 SAMPLE

Convenience sampling can often lead to highly unrepresentative samples. 81% of the sample was female, which is slightly under representative of men, as the ratio of women: men is 3:1 (Fowler et al., 2008). In terms of the distribution of types of MS, as we saw earlier, approximately 15% of the total MS population has primary progressive MS, and 65% to 85% of people with relapsing remitting develop secondary progressive MS about 15 years after diagnosis. These figures would suggest that the current sample is representative of the primary progressive population; however the numbers of participants reporting having relapsing remitting (51%), and secondary progressive (26%) do not seem representative. Considering that 65% of people with relapsing remitting MS, develop secondary progressive MS, 15 years after diagnosis, this sample can be considered representative of the MS population in general, considering the mean of 8.76 years of diagnosis. Finally, convenience sampling is representative of much of the research with MS populations and the field of psychology in general (Sheppard et al., 2010).
4.4 CLINICAL IMPLICATIONS

The results indicated that EA does not act as a mediator in the psychological distress people with MS experience. Illness representations accounted for most of the variance in psychological distress, while EA accounted for more of the variance when conceptualizing distress as depression. The main clinical implication of this research is that it increases our understanding about the processes that contribute to psychological distress within this population, and as such, this may inform therapeutic interventions and consequently, improve outcomes and the quality of life of people with MS experience.

The impact of illness representations on psychological distress evidenced by this study suggests that assisting clients to develop some sense of control over their illness and symptoms might improve their psychological wellbeing. Emotional problems are one of the most significant influences on the wellbeing and quality of life of people with MS (Rothwell et al., 1997) and may have at least as much impact as ambulatory and physical health issues (Foley et al., 2009). MS has an unpredictable course, making future disability difficult to anticipate; this uncertainty makes it hard for people with MS to maintain a sense of control over their disease. The distinct role played by illness representations suggests that cognitive factors are important in determining psychological wellbeing in this population.

Given that the strongest direct route to distress was through illness representations, targeting illness beliefs in interventions seems logical. In other areas of physical health, such as cardiac medicine and surgery, illness representation interventions have shown to be effective. Petrie et al. (2002) highlight a brief intervention designed to alter patient’s perceptions about their myocardial infarction that resulted in improved functional outcomes, in comparison to a control group. However, this intervention was designed to change inaccurate and negative illness beliefs.

How controllable, amendable to change, or inaccurate illness representations of MS actually are remains to be seen, for example in the study by Vaughan et al. (2003) the participants illness representations of MS were accurate and realistic in terms of conventional clinical views. The belief that MS had serious consequences was related to greater difficulty in each of the outcome measures (anxiety, depression and self esteem)
To believe that MS does not have serious consequences may not be a realistic assumption. Stafford (2007, p.94) wrote a recent paper entitled “Isn’t it all just obvious?”, stating “[illness representations are] all just common sense, but dressed up in big words to confuse people”. However, unlike researchers and academics, patients may not be consciously aware that their illness representations are guiding behaviour (Hale et al., 2007).

As such, illness representations may be amenable to intervention in the MS population. One therapeutic model with potential to address illness representations, whether they be accurate or inaccurate, is of course cognitive behavioural therapy (CBT). The use of CBT is recommended by the NICE guidelines for MS (NICE, 2003), suggesting that psychological treatments such as CBT should be considered for depression in the MS population. Although there is a significant amount of evidence on the efficacy of CBT as an intervention for anxiety and depressive disorders, many of these studies have been conducted with patients without significant medical problems (White & Trief, 2005). To date, CBT has been the main model used to treat depression in the MS population (Mohr, 2011), however there is a dearth of literature on the subject area and as such is ripe for future research.

The illness representations model has been used explicitly to tailor CBT interventions in pilot studies for people with systemic lupus erthematosus (Goodman et al., 2005). This intervention was found to change participant’s perceptions of treatment control and emotional representations, and perceived stress was reduced following the intervention. This is a potentially important study which may be influential for tailoring CBT treatments with MS populations, as systemic lupus erthematosus has, like MS, an unpredictable disease course with periods of illness varying widely in severity, alternating with remissions (Stoll et al., 2001). There are also high prevalence rates of mental health problems (e.g depression), in the lupus population (ibid).

To date, CBT for MS has not explicitly incorporated illness representations into a therapeutic intervention. Mohr et al. (2001) described individual CBT sessions with MS patients that included teaching specific skills for the management of MS related symptoms and problems, such as fatigue management, management of mild cognitive impairment, pain management, stress management, skills for intimacy, communication and sexual dysfunction, and management of social difficulties. As such this intervention may have
inadvertently addressed illness representations. The findings of this study concluded that CBT and anti-depressant medication were more effective than an emotional expression group. This is an interesting finding from the general non-medical psychotherapy literature, that all treatments are generally equal (Mohr et al., 2001). It seems that concerns related to the disease (Mohr, 2011), as well as the management of symptoms of distress/depression, are important to consider within psychological interventions for people with MS.

This current study also highlighted that EA is the strongest predictor of distress, when conceptualised as depression, in this population. Although this finding needs to be interpreted with caution due to measurement issues. Despite this, while EA was not the strongest predictor of distress using the GHQ-30, it did account for some of the variance in distress reported by the participants (using the GHQ-30). These findings support the application of psychotherapies that seek to reduce EA in the treatment of distress in MS populations. Given the strong relationship between illness representations and EA (.62), the results also suggest that interventions aimed at decreasing EA may limit the potential negative consequences of illness representations; however this would require further research.

This current study highlights that EA, as measured by the AAQ-II accounts for some of the variance in psychological distress, and when distress is conceptualised as depression, most of the variance in depression for people with MS however there is very little empirical literature about depression and the use of ACT, and even less about the use of ACT in the MS population.

Sheppard et al. (2010) found that a 5 hour ACT workshop for 15 participants with MS effected a statistically significant reduction in depression, as measured by the BDI, over time (p<0.05, 3 month follow up). This is the only study to apply ACT with an MS client group. This intervention used psychoeducation about MS, identifying the costs associated with the struggle to control unwanted thoughts, feelings and physiological reactions linked with MS, the importance of balancing acceptance and behaviour change strategies, values clarification exercises, using mindfulness and acceptance strategies to foster psychological flexibility when faced with MS related barriers, and using cognitive defusion techniques to reduce the behavioural impact of negative thoughts and feeling. As can be seen from the topics discussed, depression was not targeted explicitly during the
intervention, so the reduction in depression is a noteworthy finding. For example, Mindfulness was targeted explicitly but there was no change in mindfulness at 3 month follow up, which the authors suggest could represent demand characteristics such as social desirability. As such, future research is needed to further understand how ACT can be adapted for MS populations. It also may be that some of the aspects of the aforementioned ACT intervention targeted or impacted on illness representations of MS, through the use of topics such as psychoeducation about MS, identifying the costs associated with the struggle to control unwanted thoughts, feelings and physiological reactions linked with MS, or using mindfulness and acceptance strategies to foster psychological flexibility when faced with MS related barriers.

Presently two studies have investigated the effectiveness of ACT for depression (Zettle & Hayes, 1986; Zettle & Rains, 1989). Zettle and Hayes (1986) compared ACT to two forms of Cognitive Therapy (CT), and found that ACT was better than CT in reducing depressive symptoms at the 2 month follow up. However rather than focusing on EA as the mediator of change, Zettle and Hayes (1986) looked at a measure of cognitive fusion (the Automatic Thoughts Believability Questionnaire, Hollen & Kendall, 1980). Cognitive fusion is the tendency to take thoughts literally and to believe that they describe reality, rather than what they are—"just thoughts" (Spiegler & Guevremont, 2003), whereas EA involves the effort to avoid unpleasant private events (ibid). Zettle and Hayes (1986) found that cognitive fusion mediated between the other two measures of depression, the BDI and the Hamilton Depression Scale (HRSD): basically the higher the believability of the depressive thoughts at mid-treatment, the higher the effect in scores of BDI and HRSD were at post-treatment (Ruiz, 2010). Again the study by Zettle and Rains (1989) used a measure of cognitive defusion, and so future studies about depression or distress in MS populations may be interested in using a measure of EA and cognitive fusion. Given the importance of beliefs that was highlighted by this study, cognitive fusion may play a key role in furthering our understanding of distress in this population.

The finding that each of the psychological variables, illness representations and EA may uniquely contribute to the variance in psychological distress, would seem to provide support for both acceptance based interventions and cognitive therapy. While there are differences between cognitive and acceptance based interventions, especially with regard to the mechanisms of change, there are also similarities between cognitive and acceptance approaches (Arch & Craske, 2008). Given the finding that beliefs (illness
representations) have a strong direct relationship to distress both ACT and CBT offer explicit methods for dealing with thoughts or beliefs: in ACT cognitive fusion and acceptance are advocated, whereas in CBT cognitive restructuring is endorsed (ibid). What does seem clear is that whichever method is used to help clients experiencing distress, concerns related to the disease are clearly important to address.

4.5 SERVICE IMPLICATIONS

In addition to the implications for direct clinical interventions for this client group this study has some broader implications for the services that provide support for individuals with MS. Given the high levels of psychological distress in this population it is surprising that the NICE guidelines for MS (NICE, 2003), and the guidelines for commissioning MS services (Wade, 2006) have paid little attention to the mental health needs of the MS community. The 2011 audit of MS services (Wade et al., 2011) has recommended that clinical staff in primary and secondary care should be asked to use structured assessments of mood and daily activities and to refer to specialist services as appropriate.

The development of the new mental health measure in Wales (The Mental Health (Wales) Measure, 2010), which strengthens primary care psychological wellbeing services, means that this is an opportune time for the mental health needs of MS patients to be adequately addressed in Wales. However, the British Psychological Society’s response to the new measure (National Assembly for Wales, NAW, n.d) critiques the Measure and seems to suggest that it has been outlined only for mental health problems but recommends that it needs to be “for those living with other chronic conditions...likely to impact on their mental health and wellbeing”. In addition, the success of the Measure will in part depend on the availability of appropriately trained staff to offer services to individuals, and appropriately trained staff to clinically supervise those in primary care mental health (ibid). This piece of research highlights that knowledge of psychological theories such as illness representations theory may be crucial for effective psychological interventions in the MS population, and that problem based formulations (e.g. CBT for depression) are unlikely to meet the needs of clients with MS, who may require individualised formulations incorporating aspects about the illness that impact on their psychological health and wellbeing.
4.6 FUTURE RESEARCH

A bigger sample would have allowed the use of SEM, and this method of estimating path coefficients has many advantages over using multiple regression to estimate path coefficients (Klem, 1995). The first advantage is that programmes for conducting SEM (AMOS, LISREL or EQS) provide additional results such as all the implied correlations, all total effects, and the standard errors for indirect effects.

Most important, these programs calculate and reports several measures of overall fit of the model (e.g model chi-square, root mean square error of approximation (RMSEA), goodness of fit statistic (GFI) and adjusted goodness of fit statistic (AGIF) Hooper et al., 2008). As such, it is recommended that further data be gathered from the existing population base to build an adequate sample from which to conduct SEM analysis, as this will allow estimates of model fit to be garnered. The model should be tested against other competing models using this data set (i.e. the full model, versus the direct path model, versus, the indirect paths model); comparing the fit indices to predict the most accurate model for this dataset, and subsequently population. The use of SEM has another advantage, as it allows the use of latent variables rather than manifest variables, which would overcome some of the difficulties in measurement by using the EDSS. Future studies might wish to complement the use of the EDSS with other measures of functional disability in MS to reduce any possibility of measurement error. Similarly this study highlighted the importance of beliefs (illness representations), so future research may wish to focus on cognitive fusion, another component of ACT, to assess its role in mediating between beliefs and distress. In the same way that the EDSS and another measure of disability in MS might be taken together as a latent variable, a measure of EA and cognitive fusion may also be utilised to create a latent variable considered to represent psychological flexibility. That is, items from these measures (manifest variables) could be used in future research to produce latent variables, suitable for more advanced SEM statistical techniques.

In this study the BIPQ was chosen over the longer Illness Perception Questionnaire (IPQ; Weinman et al., 1996) or the IPQ-R (revised, Moss-Morris et al., 2002). The BIPQ was chosen over the IPQ, and IPQ-R as these two measures consist of between 63 to 73 items respectively, which may have impacted on participation in the study. This study was not looking at which particular parts of illness representations (identity, timeline, consequences
etc.) had the strongest relationship with distress, as this has been covered by the three studies investigating illness representations and psychological distress to date. Considering the findings of this research which highlights the role of illness representations in psychological distress for this population, future research may wish to use the longer version of the IPQ to assess the content and not just the overall strength of illness perceptions. The IPQ-R for example offers advantages over the BIPQ when researchers want to perform a more detailed analysis of participant’s identity beliefs (Broadbent et al., 2006).

As discussed in the introduction, three studies found specific parts of illness representations (identity, consequences & cure/controllability) demonstrated the greatest number of relationships with anxiety, depression and self esteem (Vaughan et al., 2003). As such incorporating just these three variables in future models may account for more of the variance in distress, than measuring illness representations in general, or using the composite score. However, more research confirming that these are the most important parts of illness representations (Vaughan et al., 2003) would be a necessary first step towards this. It is likely that illness representations are unique to the individual, but also, as Vaughan et al. (2003) did not account for MS type, it could be that certain illness representations have more prominence for certain types of MS. These questions would be very amenable to future research.

Qualitative research about illness representations may also be an important next step in order to develop an insight into how interventions can be tailored for this client group. In particular exploring how the illness representations of MS are incorporated into the lived experiences of this client group, as while illness representations are said to predict health behaviours (Leventhal et al., 1980, Leventhal et al., 1984) how they impact on the behaviours of people with MS, has not been outlined.

As has been discussed illness representations are related to coping, so future research may wish to investigate the relationship between illness representations and coping, and to further elucidate the difference between coping and EA, as to date this has not been studied using the (seven item) AAQ-II. In the ongoing debate about whether EA is a separate construct to coping, and based on the findings that illness representations influence an individual’s coping response (Turner et al., 2000), it might be worthy to
conduct a study comparing EA to coping using a similar design to this one, and see which of these paths is the strongest predictor of distress in MS.

Another future area of research is to investigate how illness representations integrate with existing schemata, for example castrophising is thought to be an important type of cognition that, in addition to illness representations and coping, independently predict depression in a sample of participants experiencing chronic pain (Turner et al., 2000). Again, this is something that would be amenable to developing a model for use with path analysis/SEM.

The role played by EA in predicting depression in this sample opens up avenues for future research on ACT and EA in MS. While Sheppard et al. (2010) have highlighted that a short ACT intervention for MS resulted in a statistically significant reduction in depression, this was an open trial and as such has many limitations. Future research may wish to investigate what parts of ACT may be effective for MS populations, in particular concentrating on ACT’s emphasis on beliefs (e.g. cognitive fusion).

4.7 CONCLUSION

This study found that each of the variables: level of physical symptoms, illness representations and EA were positively associated with psychological distress in a sample of participants with MS. When these variables were subjected to a path analysis based on theory and research, the relationship between physical symptoms, as measured by the EDSS, disappeared, but acted as a suppresser variable making the relationship between illness representations, EA and distress stronger. Together these three variables accounted for 62% of the variance in distress experienced by the participants. It was found that illness representations were the strongest predictor of distress in this population. It was hypothesised that EA would act as a mediator variable between illness representations and distress, but there was no evidence to support this, and illness representations had more of a direct impact on distress. While EA did not mediate the relationship between either physical symptoms or illness representations in relation to depression, it was the strongest predictor of depression in this population.

As such the findings have implications for psychological interventions for this clinical population. In short, the findings suggest that beliefs about the illness are important to
incorporate into interventions for psychological difficulties experienced by this client group, and that both acceptance and cognitive therapies have much to offer this client group in meeting their psychological needs. However more research is needed in terms of how illness representations impact on behaviours in this client group, and whether other parts of ACT (e.g cognitive defusion) may impact on the distress this client group experiences.

The findings of the study contribute to a psychological understanding of the complex pathways that can lead to psychological distress in this population. The relationship between psychological distress with MS status is complex (Arnett et al., 2008) but the model of distress presented in this study, has been successful in accounting for 62% of the variance in distress experienced by this population of MS participants. The study also provided preliminary evidence for the role of EA in the MS population. EA has been shown to play a key role in psychopathology and as a mediator of distress in other research.

However this study showed that while it may have a relationship to depression, it does not mediate between level of symptoms nor illness representations and the resulting distress experienced by participants in this study.

The findings of the study should be interpreted with some caution as both path analysis and cross sectional designs do not allow for making generalizations about the direction of relationships between the variables under study. Longitudinal studies may be able to address this limitation and provide a truer test of mediation than is possible with cross sectional designs. Also this research only used self report measures; which may be problematic due to response bias (social desirability) and also as cognitive impairments may have impacted on the reliability of the responses provided, as there are high rates of cognitive impairment in MS populations. The use of the EDSS to measure physical symptoms is less than adequate, and it could be argued that it is an ordinal scale rather than an interval scale required for the analysis used. However it is the most widely used measure in MS research, and future studies replicating or building on the model presented here are recommended to use SEM, where EDSS scores can be complimented by using other scales to compose a latent variable measuring disability. Finally although the current study used a convenience sample, which may have lead to an unrepresentative sample, convenience sampling is representative of much of the research in MS populations and psychology (Sheppard et al., 2010).
As mentioned future research would benefit from using a method such as SEM which has many advantages over using regression for assessing the goodness of fit of models, although this method does require quite big samples in general. Future research about the nature and impact of illness representations on distress is also recommended; how they impact on behaviour and how they integrate with existing schemata being two possible areas of interest. As has been noted psychological interventions that incorporate illness representations components (CBT) have proven effective to date, and further research on illness representations will increase our understanding of how interventions can be most effectively tailored for this population. Also the relationship between illness representations, coping and EA is another area ripe for exploration. The preliminary finding that EA is the strongest predictor of depression, also suggests that researching ACT as an intervention for depression in MS would be useful, as this has not been researched to date with rigorous and controlled methods and designs.
REFERENCES:


### APPENDIX 2: THE STROBE CHECKLIST

STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

<table>
<thead>
<tr>
<th>Item No</th>
<th>Item</th>
<th>Recommendation</th>
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| 1       | **Title and abstract** | (a) Indicate the study’s design with a commonly used term in the title or the abstract.  
(b) Provide in the abstract an informative and balanced summary of what was done and what was found. |
| 2       | **Introduction** | Explain the scientific background and rationale for the investigation being reported. |
| 3       | **Objectives** | State specific objectives, including any prespecified hypotheses. |
| 4       | **Methods** | Present key elements of study design early in the paper. |
| 5       | **Participants** | (a) Give the eligibility criteria, and the sources and methods of selection of participants. |
| 6       | **Variables** | Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable. |
| 7       | **Data sources/measurement** | For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group. |
| 8       | **Bias** | Describe any efforts to address potential sources of bias. |
| 9       | **Study size** | Explain how the study size was arrived at. |
| 10      | **Quantitative variables** | Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why. |
| 11      | **Statistical methods** | (a) Describe all statistical methods, including those used to control for confounding  
(b) Describe any methods used to examine subgroups and interactions  
(c) Explain how missing data were addressed  
(d) If applicable, describe analytical methods taking account of sampling strategy  
(g) Describe any sensitivity analyses. |
| 12      | **Results** | Participants  
(a) Report numbers of individuals at each stage of study—e.g., numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analyzed.  
(b) Give reasons for non-participation at each stage  
(c) Consider use of a flow diagram. |
| 13      | **Descriptive data** | (a) Give characteristics of study participants (e.g., demographic, clinical, social) and information on exposures and potential confounders. |
| 14      | **Outcome data** | (a) Indicate number of participants with missing data for each variable of interest. |
| 15      | **Main results** | Report numbers of outcome events or summary measures. |
| 16      | **Other analyses** | (a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (e.g., 95% confidence interval). Make clear which confounders were adjusted for and why they were included.  
(b) Report category boundaries when continuous variables were categorized  
(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period. |
<table>
<thead>
<tr>
<th>Discussion</th>
<th></th>
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<tbody>
<tr>
<td><strong>Key results</strong></td>
<td>18</td>
</tr>
<tr>
<td><strong>Limitations</strong></td>
<td>19</td>
</tr>
<tr>
<td><strong>Interpretation</strong></td>
<td>20</td>
</tr>
<tr>
<td><strong>Generalisability</strong></td>
<td>21</td>
</tr>
<tr>
<td><strong>Other information</strong></td>
<td></td>
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<tr>
<td><strong>Funding</strong></td>
<td>22</td>
</tr>
</tbody>
</table>

*Give information separately for exposed and unexposed groups.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of *PLoS Medicine* at http://www.plosmedicine.org/, *Annals of Internal Medicine* at http://www.annals.org/, and *Epidemiology* at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.
| Study                        | Design                          | Psychologic distress measures | Experiential avoidance measure | Participants | N  | Female % | Mean Age (Range) | Methodology                                      | Key findings                                                                 | Limitations/Comments                                                                 |
|------------------------------|---------------------------------|------------------------------|--------------------------------|--------------|----|-----------|-----------------|-----------------------------------------------|---------------------------------------------------------------------------------|
| Andrew & Dulin 2007          | Cross-sectional (within subjects) | GDS-SF (Geriatric Depression Scale Short Form) | AAQ-16 item High scores represent experiential avoidance | Individuals over 70 living in their own home or in a retirement village in New Zealand | 208 | 67%       | 70 to 90+ (80-84) | Hierarchical multiple regression analyses     | There was a significant positive correlation between depression and experiential avoidance ($r=0.37$, $p<0.01$), and anxiety and experiential avoidance ($r=0.43$; $p<0.01$).  
Experiential avoidance explained 8% of the unique variance in depression ($\beta=1.96$; $p<0.01$), 20% in anxiety ($\beta=3.12$; $p<0.01$), and moderated the relationships between self reported health and both depression and anxiety. | Generalisability of findings: sample was healthy, community dwelling older adults, with low levels of depression.  
AAQ 16 item, not a unidimensional measure of experiential avoidance.  
Baron and Kenny (1986) procedures used to test moderation. |
| Berking, Neacsiu, Comtois & Linehan (2009) | Longitudinal (within subjects) | HRS (Hamilton Rating Scale 25 item version) | 16 item AAQ High scores=more experiential avoidance | Outpatient females during 1 year of treatment for BPD | 81  | 100%      | 28.9 (11-44) | Pearson's correlation Hierarchical linear modeling Structural equation modeling | Experiential avoidance was positively associated with greater severity of depression at all points of assessment (range between BDI) $r=0.44-0.61$, (HRSD) $r=0.34-0.67$.  
Reductions of experiential avoidance during treatment was significantly associated with a greater reduction of depression ($r=0.85$) experiential avoidance predicted subsequent reduction of depression whereas the level of depression did not predict subsequent changes in experiential avoidance. | AAQ 16 not a unidimensional measure of experiential avoidance  
Sample size was small for use with structural equation modeling  
Only female sample, reducing the generalisability of the studies |
<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Psychologic measures</th>
<th>Experiential avoidance measure</th>
<th>Participants</th>
<th>N</th>
<th>Female %</th>
<th>Mean Age (Range)</th>
<th>Methodology</th>
<th>Key findings</th>
<th>Limitations/Comments</th>
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<tr>
<td>Berman, Wheaton, McGrath &amp; Abramowitz</td>
<td>Cross sectional (within subjects)</td>
<td>BAI (Beck Anxiety Inventory)</td>
<td>High scores = greater psychological flexibility/less experiential avoidance</td>
<td>Primary diagnosis of an anxiety disorder (e.g. OCD, panic disorder, social phobia, GAD)</td>
<td>42</td>
<td>86%</td>
<td>27.21 (18-63)</td>
<td>Hierarchical regression analyses</td>
<td>Correlational analyses indicated associations between anxiety sensitivity and experiential avoidance ($r = -.48$, $p &lt; 0.001$) and AI and experiential avoidance are correlated with anxiety ($r = .52$, $p &lt; 0.001$; $r = -.43$, $p &lt; 0.001$). The physical concerns dimensions of AS predicted anxiety symptom severity independently of experiential avoidance ($R^2 = .36$, $p &lt; 0.01$)</td>
<td>BAI may measure panic symptoms rather than anxiety per se AAQ-II ten item not a unidimensional measure of experiential avoidance</td>
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<tr>
<td>Bohlmeijer, Fledderus, Rokx, Pieterse</td>
<td>Cross sectional study (between subjects)</td>
<td>Center for Epidemiologic Studies Depression Scale (CES-D)</td>
<td>High score indicates higher acceptance and less experiential avoidance</td>
<td>Adults with mild to moderate psychological distress</td>
<td>49</td>
<td>86%</td>
<td>49 (24-71)</td>
<td>t-tests Chi square tests Group comparisons</td>
<td>ACT intervention led to statistically significant reduction in depressive symptoms ($F = 9.19$ (post treatment, and 9.30 (follow-up), $p &lt; 0.03$; $HADS = F = 7.97$ ($p &lt; 0.006$) &amp; 4.23 ($p &lt; 0.043$) $CIS = F = 8.24$ ($p &lt; 0.005$) &amp; 7.84 ($p &lt; 0.006$). Results for Cohen’s d showed medium effect sizes at post tx and follow up ($CES-D = .60$ &amp; .63; $HADS = .67$ &amp; .56). Meditational analysis shows that the improvement of AAQ-II from baseline to post-treatment significantly predicted scores on the CES-D at follow up (bootstrapping values between -4.10 and -.67 (adjusted $R^2$ values).</td>
<td>Control group (n=44) waiting list, randomly assigned to the ACT intervention, or waiting list. Groups stratified on gender and age. Mental health relied on self report ratings rather than clinician ratings Number of participants using medication longer than three months prior to starting group, and changes to medication was not assessed AAQ-II ten item not a unidimensional measure of experiential avoidance Mediation analysis used guidelines by Preacher &amp; Hayes (2004)</td>
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<td>Study</td>
<td>Design</td>
<td>Psychologic distress measures</td>
<td>Experiential avoidance measure</td>
<td>Participants</td>
<td>N</td>
<td>Female %</td>
<td>Mean Age (Range)</td>
<td>Methodology</td>
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<td>Costa &amp; Pinto-Gouveia (2011)</td>
<td>Cross-sectional (within subjects)</td>
<td>CSQ Coping Styles Questionnaire</td>
<td>AQ-ten item</td>
<td>Adults recruited from Primary care settings in Portugal With a specific chronic pain condition, e.g. rheumatoid arthritis</td>
<td>70</td>
<td>90%</td>
<td>Male 61 (SD 16.81)</td>
<td>Pearson correlation matrix</td>
<td>Experiential avoidance was highly and positively correlated with depression ($r = 0.67; p &lt; 0.001$) and stress ($r = 0.693; p &lt; 0.001$), and moderately with anxiety ($r = 0.0314; p &lt; 0.05$). Experiential avoidance partially mediated the relationship between rational coping and depression ($z = -2.16; p = 0.003$). Experiential avoidance fully mediated the effect of detached/emotional coping in depression ($z = -3.08; p = 0.00$). Experiential avoidance partially mediated the effect of rational coping on stress ($z = -2.20; p = 0.03$). Rational coping was negatively correlated with depression ($r = -0.4; p &lt; 0.001$), anxiety ($r = -0.301; p &lt; 0.05$), and stress ($r = -0.439; p &lt; 0.001$). Detached/emotional coping was negatively correlated with depression ($r = -0.28; p &lt; 0.05$) and stress ($r = -0.74; p &lt; 0.01$).</td>
<td>Excluded severe psychopathology in the sample which limits the generalisability of the findings. AAQ ten item not a unidimensional measure of experiential avoidance Baron and Kenny (1986) procedures used to test mediation</td>
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<td>Study</td>
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<td>Fledderus, Bohlmeijer &amp; Pieterse (2010)</td>
<td>Cross-sectional study (within subjects)</td>
<td>UCL (Utrecht coping list ) CES-D (Centre for epidemiologic studies depression scale ) HADS-A (Hospital anxiety and depression scale-anxiety subscale ) MHC-SF (Mental Health continuum: short form)</td>
<td>AAQ-II 10 item Higher scores= more acceptance Dutch participants with Mild to moderate anxiety or depressive symptoms Excluded those with severe pathology, and those who recently started pharmacological treatment</td>
<td>93</td>
<td>82%</td>
<td>49 (24-71)</td>
<td>Pearson correlation s and multiple regression analyses</td>
<td>Lower levels of experiential avoidance (high acceptance) strongly related to reduced passive coping ($r = -0.56, p &lt;0.01$). Higher acceptance strongly related to decreased anxiety ($r = -.47, p &lt;0.01$), and better emotional wellbeing ($r = 0.38, p &lt;0.01$). Experiential avoidance mediates the effects of passive coping on both increased anxiety ($z= 4.36, p = .01$) and depression ($z= 2.79, p =.01$)and decreased emotional ($z= -2.26, p = .05$) and psychological wellbeing ($z= -2.05, p =.05$). Results suggest that a person who is prone to use experiential avoidance or has learned experiential avoidance strategies has a higher risk of developing psychopathology and lower mental health. Early interventions may be useful.</td>
<td>Control: Half the sample was randomised to waiting list Sample was predominately male, but was a diversity of age, education and psychological distress. AAQ-II ten item not a unidimensional measure of experiential avoidance Baron and Kenny (1986) procedures used to test mediation</td>
<td></td>
</tr>
<tr>
<td>Study</td>
<td>Design</td>
<td>Psychologic measures</td>
<td>Experiential avoidance measure</td>
<td>Participants</td>
<td>N</td>
<td>Female %</td>
<td>Mean Age (Range)</td>
<td>Methodology</td>
<td>Key findings</td>
<td>Limitations/Comments</td>
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<tr>
<td>Goldstone, Farhall, Ong (2011)</td>
<td>Cross sectional study (within subjects)</td>
<td>PDI (Peters Delusions Inventory) (Survey of recent life events)</td>
<td>AAQ-II 10 item High scores= more acceptance</td>
<td>N=100</td>
<td>100</td>
<td>44%</td>
<td>26-35 (mean not given)</td>
<td>Pearson product-moment correlations Bootstrapping (method prescribed by Preacher &amp; Hayes, 2004)</td>
<td>Both life hassles and experiential avoidance were strongly associated with each of the delusions measures (-.49 &amp; -.61 in the non-clinical sample; -.40 &amp; -.48 in the clinical sample; ( r^2 )’s in the &lt;0.01). Life stress was a significant predictor of experiential avoidance ( (t(131) = -8.46, p &lt;0.001) ) as were delusions ( (t(131) = 6.81, p &lt;0.001) ). Thereafter in the presence of life hassles, experiential avoidance was found to be a significant predictor of both delusions ( (t(130) = -3.09, p &lt;0.001) ) and delusional distress ( (t(130) = -5.06, p &lt;0.001) ). Although still significant the impact of life stress upon delusions ( t(130) = 3.82, p &lt;0.001, ) and delusional distress ( t(130) = 3.92, p &lt;0.001 ) was markedly diminished when the influence of experiential avoidance was controlled for. The findings suggest that individuals with a tendency to use experiential avoidance to suppress or avoid unwanted thoughts (clinical and nonclinical samples) are significantly more likely to experience delusions in response to stressful life events.</td>
<td>Diagnosis was not confirmed, but self reported. AAQ-II ten item not a unidimensional measure of experiential avoidance. Used a non-clinical sample of 133. This non-matched sample limits the appropriateness of comparing findings across the 2 samples. Mediation analysis used guidelines by Preacher &amp; Hayes (2004).</td>
</tr>
<tr>
<td>Study</td>
<td>Design</td>
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<tr>
<td>Gratz, Tull &amp; Gunderson (2008)</td>
<td>Cross sectional study (within subjects)</td>
<td>SCID (Structured Clinical Interview for DSM-IV Axis I disorders)</td>
<td>AQ-nine item</td>
<td>Adults meeting five or more criteria for borderline personality disorder (BPD) using the DIPD-IV and the SCID</td>
<td>One way Anova’s Logistic regression analysis</td>
<td>Anxiety sensitivity predicts experiential avoidance ($F(1, 39) = 5.30$, adjusted $R^2 = .10$, $p &lt; .05$). The relationship between anxiety sensitivity and borderline personality disorder was mediated by experiential avoidance ($x^2 = 37.36$, $p &lt; .01$). AS and experiential avoidance as mediator accounted for a significant amount of additional variance (81%) in BPD above and beyond negative effect ($x^2 = 5.33$, $p &lt; .05$), affect intensity/reactivity and impulsivity ($x^2 = 5.29$, $p &lt; .05$)</td>
<td>Control consisted of n=20 who did not meet full criteria for any personality disorder, and not meet more than three criteria for BPD. Small and predominantly female sample (approx 85% in each condition) AAQ nine item not a unidimensional measure of experiential avoidance</td>
<td></td>
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<td>Control consisted of n=20 who did not meet full criteria for any personality disorder, and not meet more than three criteria for BPD. Small and predominantly female sample (approx 85% in each condition) AAQ nine item not a unidimensional measure of experiential avoidance</td>
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<td>Female %</td>
<td>Mean Age (Range)</td>
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<tr>
<td>Iverson, Follette, Pistorello &amp; Fruzzetti (2011)</td>
<td>Cross sectional study (within subjects)</td>
<td>SCID SASI-II (Suicide attempt self-injury Interview) DERS (Difficulties in Emotion Regulation Scale) DTS (Distress Tolerance Scale) PAI-BOR (Personality Assessment Inventory- Borderline features scale) BDI-II PASAT-C (The Paced auditory serial addition task-computerised version)</td>
<td>AAQ-II 10 item High scores = more acceptance</td>
<td>Adults with BPD or sub threshold BPD (3/4 symptoms) US sample 32 women 8 men</td>
<td>40</td>
<td>80%</td>
<td>20.8 (18-25)</td>
</tr>
<tr>
<td>Study</td>
<td>Design</td>
<td>Psychological distress measures</td>
<td>Experiential avoidance measure</td>
<td>Participants</td>
<td>Methodology</td>
<td>Key findings</td>
<td>Limitations/Comments</td>
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<tr>
<td>Kashdan, Morina &amp; Priebe (2009)</td>
<td>Cross-sectional study (within subjects)</td>
<td>MINI (MINI International Neuropsychiatric Interview)</td>
<td>AAQ-nine item</td>
<td>Albanian civilian survivors of the Kosovar war.</td>
<td>Hierarchic regression analyses</td>
<td>Presence of PTSD (partial $n^2p=.16$), SAD (partial $n^2p=.21$), or MDD (partial $n^2p=.30$) was associated with greater experiential avoidance and global distress and lower QoL ($p&lt;0.005$).</td>
<td>Measures were translated to Albanian, then back translated, suggesting possible limitations, suggesting limitations with construct validity.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LSL (Life stressor Checklist-revised)</td>
<td>Higher scores on the AAQ 9 represent greater experiential avoidance</td>
<td>At least 23 years of age (indicative of being at least 16 years old during the war) having experienced a war related stressor (match the stressor criterion 1A of PTSD described by DSM-IV)</td>
<td></td>
<td>Experiential avoidance was a partial mediator of the effects of social anxiety disorder (SAD) and post-traumatic stress disorder (PTSD) on quality of life (QOL). Only war survivors without SAD and low experiential avoidance reported elevated QOL; people with either SAD or high reliance on experiential avoidance reported compromised low QOL.</td>
<td>Baron and Kenny (1986) procedures used to test mediation</td>
</tr>
<tr>
<td>Study</td>
<td>Design</td>
<td>Psychologic al distress measures</td>
<td>Experiential avoidance measure</td>
<td>Participants</td>
<td>N</td>
<td>Female %</td>
<td>Mean Age (Range)</td>
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<tr>
<td>Lee, Orsillo, Roemer &amp; Allen (2010)</td>
<td>Cross sectional study (within subjects)</td>
<td>ADIS-IV (Anxiety Disorders Interview Schedule for DSM-IV) PSWQ (Penn state worry questionnaire) DASS-21 IUS (Intolerance of uncertainty scale) ACS (Affective Control Scale)</td>
<td>AAQ- 16 item High scores equal to high experiential avoidance</td>
<td>Adults recruited in Boston, with a principal diagnosis of GAD with a ADIS severity rating of at least 4.</td>
<td>66</td>
<td>61%</td>
<td>33.58 (19-66)</td>
</tr>
<tr>
<td>Manos, Cahill, Wetterneck et al. (2010)</td>
<td>Longitudinal (within subjects)</td>
<td>Y-BOCS-SR (Yale-Brown Obsessive Compulsive Scale) OCI-R (Obsessive Compulsive Inventory-Revised) OBQ44 (Obsessive beliefs questionnaire-44) BDI BAI</td>
<td>AAQ-nine item High scores=greater experiential avoidance</td>
<td>Adults from Wisconsin US, with a primary diagnosis of OCD</td>
<td>108</td>
<td>55%</td>
<td>32.1 (18-65)</td>
</tr>
<tr>
<td>Study</td>
<td>Design</td>
<td>Psychologic distress measures</td>
<td>Experiential avoidance measure</td>
<td>Participants</td>
<td>N</td>
<td>Female %</td>
<td>Mean Age (Range)</td>
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<tr>
<td>Morina, Stangier &amp; Risch (2008)</td>
<td>Cross sectional study (within subjects)</td>
<td>MINI IES-R (Impact of events scale-revised)</td>
<td>AAQ-nine item Higher scores on the AAQ represent greater experiential avoidance</td>
<td>Albanian civilian survivors of the Kosovo war. At least 23 years of age (indicative of being at least 16 years old during the war) having experienced a war related stressor (match the stressor criterion 1A of PTSD described by DSM-IV)</td>
<td>84</td>
<td>56%</td>
<td>38.4 (22-60)</td>
</tr>
<tr>
<td>Study</td>
<td>Design</td>
<td>Psychologic measures</td>
<td>Experiential avoidance measure</td>
<td>Participants</td>
<td>N</td>
<td>Female %</td>
<td>Mean Age (Range)</td>
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</tr>
<tr>
<td>Morina, Ford, Risch, Morina &amp; Stangier (2010)</td>
<td>Cross sectional study (within subjects)</td>
<td>MINI PHQ (Patient Health Questionnaire)</td>
<td>IES-R GHQ-12 (General health questionnaire -12 item)</td>
<td>Albanian civilian survivors of the Kosovo war having experienced a war related stressor (match the stressor criterion 1A of PTSD described by DSM-IV)</td>
<td>163</td>
<td>61%</td>
<td>45 (24-63)</td>
</tr>
</tbody>
</table>
APPENDIX 4: BACKGROUND INFORMATION QUESTIONNAIRE:

1. Age: ____________

2. Gender
   Male: [ ]
   Female: [ ]

3. How long have you experienced the symptoms of Multiple Sclerosis?
   For ________ years

4. When were you diagnosed with Multiple Sclerosis?
   In ____________(e.g. 1980 etc)

5. What type of Multiple Sclerosis do you have?
   Relapsing remitting: [ ]
   Benign Multiple Sclerosis: [ ]
   Secondary progressive Multiple Sclerosis: [ ]
   Primary progressive Multiple Sclerosis: [ ]
   Don't know: [ ]
APPENDIX 5: EXPANDED DISABILITY STATUS SCALE- SELF REPORT

SOUTH WALES DOCTORAL PROGRAMME IN CLINICAL PSYCHOLOGY
CWRS DOCTORIAETH DE CYMRU Mewn SEICOLEG CLINIGOL

THE EXPANDED DISABILITY STATUS SCALE: SELF REPORT

Question 1: Are you able to walk independently-without the use of a walking stick or frame or person to hold or FES machine or other support? (please tick)

- [ ] Yes- Please go to Question 2
- [ ] No- Please go to Question 3 on the next page

Question 2: At your best, how far can you walk without a rest or help from a stick or frame or person or FES or other walking aid? (please tick)

- [ ] Unrestricted (I can walk for 2-3 hours with no problem)
- [ ] Clearly more than 500 metres/550 yards
- [ ] About 500 metres/550 yards
  (about the length of Queens Street in Cardiff)
- [ ] About 300 metres/330 yards
  (the length of 3 football pitches)
- [ ] About 200 metres/220 yards
  (half of Queens Streets in Cardiff or 2 football pitches)
- [ ] About 100 metres/110 yards
  (the length of one football pitch or the outpatients Corridor in the UHW hospital)
- [ ] Less than 100 metres/110 yards

If you can walk without the aid of a walking aid such as a stick, you have finished this questionnaire, and can move onto the next questionnaire overleaf.

If you need help to walk or use a wheelchair, please continue to Question 3
<table>
<thead>
<tr>
<th>Question 3: Please tick the box below that best describes your walking ability.</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ I can walk more than, or about, 100 metres/110 yards (the length of a Football pitch) with 1 stick or person or support</td>
</tr>
<tr>
<td>□ I use an FES machine to walk (on one leg/on both legs-please ring)</td>
</tr>
<tr>
<td>□ I need support on both sides to walk, such as 2 sticks or a Walker/frame</td>
</tr>
<tr>
<td>□ I can only walk about 10 metres (just about across a room)</td>
</tr>
<tr>
<td>□ I can only walk a few steps even with help and normally use a wheelchair</td>
</tr>
<tr>
<td>□ I use a wheelchair all of the time and can’t take even a few steps</td>
</tr>
</tbody>
</table>

| Question 4: If you are bed or chair bound, do you have trouble using your hands for writing and eating, etc. | Yes □ |
|---------------------------------------------------------------|
| No □ |

| Question 5: Are you totally confined to bed and need help with all daily tasks? | Yes □ |
|---------------------------------------------------------------|
| No □ |
**APPENDIX 6: ACCEPTANCE AND ACTION QUESTIONNAIRE-II**

V1.1 18/03/11

**AAQ-II**

Below you will find a list of statements. Please rate how true each statement is for you by circling a number next to it. Use the scale below to make your choice.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>never true</td>
<td>very seldom true</td>
<td>seldom true</td>
<td>sometimes true</td>
<td>frequently true</td>
<td>almost always true</td>
<td>always true</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Statement</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>It's OK if I remember something unpleasant.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>My painful experiences and memories make it difficult for me to live a life that I would value.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>I'm afraid of my feelings.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>I worry about not being able to control my worries and feelings.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>My painful memories prevent me from having a fulfilling life.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>I am in control of my life.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Emotions cause problems in my life.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>It seems like most people are handling their lives better than I am.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Worries get in the way of my success.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>My thoughts and feelings do not get in the way of how I want to live my life.</td>
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<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
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## APPENDIX 7: THE BRIEF ILLNESS PERCEPTION QUESTIONNAIRE

### The Brief Illness Perception Questionnaire

For the following questions, please circle the number that best corresponds to your views:

<table>
<thead>
<tr>
<th>Question</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>How much does your Multiple Sclerosis (MS) affect your life?</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>No affect at all</td>
<td>Severe affects my life</td>
</tr>
<tr>
<td>How long do you think your MS will continue?</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>A very short time</td>
<td>Forever</td>
</tr>
<tr>
<td>How much control do you feel you have over your MS?</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>Absolutely no control</td>
<td>Extreme amount of control</td>
</tr>
<tr>
<td>How much do you think your treatment can help your MS?</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>Not at all</td>
<td>Extremely helpful</td>
</tr>
<tr>
<td>How much do you experience symptoms from your MS?</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>No symptoms at all</td>
<td>Many severe symptoms</td>
</tr>
<tr>
<td>How concerned are you about your MS?</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>Not at all concerned</td>
<td>Extremely concerned</td>
</tr>
<tr>
<td>How well do you feel you understand your MS?</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>Don't understand at all</td>
<td>Understand very clearly</td>
</tr>
<tr>
<td>How much does your MS affect you emotionally? (e.g. Does it make you angry, scared, upset or depressed?)</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>Not at all affected emotionally</td>
<td>Extremely affected emotionally</td>
</tr>
</tbody>
</table>

Please list in rank-order the three most important factors that you believe caused your MS. The most important causes for me:

1. 
2. 
3. 

124
APPENDIX 8: THE GENERAL HEALTH QUESTIONNAIRE

GENERAL HEALTH QUESTIONNAIRE

Please read this carefully:

We should like to know if you have had any medical complaints, and how your health has been in general, over the past few weeks. Please answer ALL the questions simply by underlining the answer which you think most nearly applies to you. Remember that we want to know about present and recent complaints, not those you had in the past. It is important that you try to answer ALL the questions.

Thank you very much for your co-operation.

HAVE YOU RECENTLY:

<table>
<thead>
<tr>
<th>Question</th>
<th>Better than usual</th>
<th>Same as usual</th>
<th>Less than usual</th>
<th>Much less than usual</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 — been able to concentrate on whatever you're doing?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 — lost much sleep over worry?</td>
<td>Not at all</td>
<td>No more than usual</td>
<td>Rather more than usual</td>
<td>Much more than usual</td>
</tr>
<tr>
<td>3 — been having restless, disturbed nights?</td>
<td>Not at all</td>
<td>No more than usual</td>
<td>Rather more than usual</td>
<td>Much more than usual</td>
</tr>
<tr>
<td>4 — been managing to keep yourself busy and occupied?</td>
<td>More so than usual</td>
<td>Same as usual</td>
<td>Rather less than usual</td>
<td>Much less than usual</td>
</tr>
<tr>
<td>5 — been getting out of the house as much as usual?</td>
<td>More so than usual</td>
<td>Same as usual</td>
<td>Less than usual</td>
<td>Much less than usual</td>
</tr>
<tr>
<td>6 — been managing as well as most people would in your shoes?</td>
<td>Better than most</td>
<td>About the same</td>
<td>Rather less well</td>
<td>Much less well</td>
</tr>
<tr>
<td>7 — felt on the whole you were doing things well?</td>
<td>Better than usual</td>
<td>About the same</td>
<td>Less well than usual</td>
<td>Much less well</td>
</tr>
<tr>
<td>8 — been satisfied with the way you've carried out your task?</td>
<td>More satisfied</td>
<td>About same as usual</td>
<td>Less satisfied than usual</td>
<td>Much less satisfied</td>
</tr>
<tr>
<td>9 — been able to feel warmth and affection for those near to you?</td>
<td>Better than usual</td>
<td>About same as usual</td>
<td>Less well than usual</td>
<td>Much less well</td>
</tr>
<tr>
<td>10 — been finding it easy to get on with other people?</td>
<td>Better than usual</td>
<td>About same as usual</td>
<td>Less well than usual</td>
<td>Much less well</td>
</tr>
<tr>
<td>11 — spent much time chatting with people?</td>
<td>More time than usual</td>
<td>About same as usual</td>
<td>Less time than usual</td>
<td>Much less than usual</td>
</tr>
<tr>
<td>12 — felt that you are playing a useful part in things?</td>
<td>More so than usual</td>
<td>Same as usual</td>
<td>Less useful than usual</td>
<td>Much less useful</td>
</tr>
<tr>
<td>13 — felt capable of making decisions about things?</td>
<td>More so than usual</td>
<td>Same as usual</td>
<td>Less so than usual</td>
<td>Much less capable</td>
</tr>
</tbody>
</table>

PLEASE TURN OVER
**HAVE YOU RECENTLY:**

<table>
<thead>
<tr>
<th>Question</th>
<th>Not at all</th>
<th>No more than usual</th>
<th>Rather more than usual</th>
<th>Much more than usual</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 — felt constantly under strain?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 — felt you couldn’t overcome your difficulties?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16 — been finding life a struggle all the time?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17 — been able to enjoy your normal day-to-day activities?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 — been taking things hard?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19 — been getting scared or panicky for no good reason?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 — been able to face up to your problems?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 — found everything getting on top of you?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22 — been feeling unhappy and depressed?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23 — been losing confidence in yourself?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24 — been thinking of yourself as a worthless person?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25 — felt that life is entirely hopeless?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26 — been feeling hopeful about your own future?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27 — been feeling reasonably happy, all things considered?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28 — been feeling nervous and strung-up all the time?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29 — felt that life isn’t worth living?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 — found at times you couldn’t do anything because your nerves were too bad?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Published by GL Assessment Limited
The Chiswick Centre, 414 Chiswick High Road, London W4 5TF.
GL Assessment is part of the Granada Learning Group

First published 1978.
APPENDIX 9: FACTOR STRUCTURE OF THE GENERAL HEALTH QUESTIONNAIRE

Factor A – Anxiety

2 Lost much sleep over worry?
14 Felt constantly under strain?
15 Felt you couldn’t overcome your difficulties?
18 Been taking things hard?
21 Found everything getting on top of you?
22 Been feeling unhappy and depressed?
23 Been losing confidence in yourself?
28 Been feeling nervous and strung-up?

Factor B – Feelings of incompetence

4 Been managing to keep yourself busy and occupied?
6 Been managing as well as most people would in your shoes?
7 Felt on the whole you were doing things well?
8 Been satisfied with the way you’ve carried out your task?

Factor C – Depression

24 Been thinking of yourself as a worthless person?
25 Felt that life is entirely hopeless?
26 been feeling hopeful about your own future?
29 Felt that life isn’t worth living?
30 Found at times you couldn’t do anything because your nerves were too bad?

Factor D – Difficulty in coping

13 Felt capable of making decisions about things?
16 Been finding life a struggle all the time?
17 Been able to enjoy your normal day-to-day activities?
19 Been getting scared or panicky for no good reason?
27 Been feeling reasonably happy, all things considered?

Factor E – Social dysfunction

5 Been getting out of the house as much as usual?
10 Been finding it easy to get on with other people?
11 Spent much time chatting with people?
Dear XXXX

I am collaborating with James Feeney from Cardiff University on a research project investigating different factors that may influence how well people adjust to and cope with having multiple sclerosis. Understanding more about the different factors that may influence how well people adjust to and cope with MS will help us in developing new approaches to helping people who experience difficulties with this.

We would like to invite you to take part in the research. The study involves asking people to complete some questionnaires about themselves and their symptoms, then returning them to us. It will take approximately 20-30 minutes to fill them in. I have included information about the study that James is conducting as well as the questionnaires that we would like people who agree to take part to fill in and return to us at the Helen Durham Centre (we have enclosed a stamp addressed envelope for this).

It is up to you whether you take part or not and if you do not wish to take part in the study then you do not need to do anything further. If you do not wish to take part in the study then it will not affect the care you receive from the Helen Durham Centre for Neuroinflammatory Diseases in any way.

If after reading the information you have any further questions then please feel free to contact James on the details provided.

Yours sincerely,

Dr Phil Moore
Clinical Psychologist in Neuropsychology, University Hospital for Wales
Honorary Research Fellow, Cardiff University Medical School
APPENDIX 11: INFORMATION SHEET

You are being invited to take part in a research study that is being carried out by Dr Phil Moore (Clinical Psychologist), Dr Andrew Vidgen (Clinical Psychologist), and James Feeney (Trainee Clinical psychologist). Before you make a decision about taking part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Take time to decide whether you wish to take part. If you have any questions or there is something further that you are unsure about, please feel free to contact James Feeney to discuss it further.

What is the research?
We are looking at some of the factors that can cause people with Multiple Sclerosis (MS) to experience psychological distress or that can affect their quality of life. In particular we are looking at factors such as coping and emotional difficulties, but also the physical difficulties people with MS may experience, and how these three ideas relate to each other. The study aims to involve individuals who are experiencing difficulties in these areas, and those who are not, so that we can develop a better understanding of the types of difficulties that different people experience, and why that might occur.

Why have I been invited to participate?
The study aims to involve as many people as possible who have been diagnosed with a neuroinflammatory condition such as MS; whether or not they have experienced any significant or noticeable cognitive, physical, social or emotional difficulties. We are hoping to contact over 200 people to take part in the study.

Do I have to take part?
No. You do not have to take part in this research if you do not want to, and you do not have to give a reason why you do not want to take part. This decision will not affect the service you receive in any way. This information sheet describes the study, however if you have any further questions about the study please contact the researcher and they will talk through any questions you have.
If you agree to take part in the study then we will ask you to sign a consent form.

**What will taking part in the study involve?**
If you consent to participating in the research, we will ask you to complete 5 questionnaires. The details of the questionnaires are listed below:

1) A Background Information sheet: This asks you for some information about yourself, your age, your gender, how long you have experienced symptoms of MS, when you were diagnosed with MS, and what subtype of MS you have.

2) The Expanded Disability Status Scale: this will ask you some questions about the physical symptoms you experience as a result of MS. Most of the questions ask about walking, and the distances you walk.

3) The Brief Illness Perception Questionnaire: This is a series of 10 questions asking for your views about your illness.

4) The Acceptance and Action Questionnaire-II: This will ask 10 questions about how you deal with emotions and emotional problems in general.

5) The General Health Questionnaire (GHQ-30): This has 30 questions that ask about your psychological wellbeing (sadness, anxiety, depression, social life, confidence) at this present time.

In total completion of the questionnaires will take between 25 and 45 minutes. You will have no obligation to complete all this information and can decide not to complete any of these, when you are undertaking these. For instance, you may wish to complete some parts of the questionnaires, but not all of it.

You may wish to have a friend or relative help you to fill out some of the questionnaires, especially if you have difficulty reading or concentrating for long periods.

If you have difficulty filling out the Background Information questionnaire, the consent form asks your permission to access your file at the Helen Durham Centre if any of this information is missing. This will be done by a member of the team, and passed onto me, so I would not access your file directly.

If you choose to complete the questionnaires we have provided you with a pre-paid addressed envelope in order for you to return the questionnaires.

**What are the possible benefits of taking part?**
While there will be no direct benefit to you, it is hoped the information you provide will help clinicians to gain a better understanding of what may or may not cause emotional difficulties, and thus help us support people better. There is currently little research that helps to inform our understanding of the social and emotional wellbeing of individuals with MS. Understanding more about this can then help in the management of these conditions.

**What are the disadvantages of taking part?**
It is possible that some of the questionnaires may make you feel uncomfortable or distressed. However if at any point during the completion of
If you agree to take part in the study then we will ask you to sign a consent form.

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If you consent to participating in the research, we will ask you to complete 5 questionnaires. The details of the questionnaires are listed below:

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**What are the disadvantages of taking part?**
It is possible that some of the questionnaires may make you feel uncomfortable or distressed. However if at any point during the completion of
All research in the NHS is looked at by an independent group of people, called a research ethics committee, whose job it is to protect your safety, rights and wellbeing and dignity. This study has been reviewed and given favourable opinion by the local research ethics committee.

Finding out more before deciding
Please do ask any questions that you have. I can be contacted by e-mail, letter or telephone. I am very happy to discuss the study with you further, and answer any questions you have.

James Feeney (in collaboration with Dr Phil Moore)
Doctoral Programme in Clinical Psychology
1st floor, Archway House,
77 Ty Glas Avenue, Llanishen,
Cardiff,
CF145DX

Telephone: 02920 206464
E-mail: James.Feeney@wales.nhs.uk

The Helen Durham Centre
Neuro-Inflammatory Unit
Department of Neurology
University Hospital of Wales
Heath Park
Cardiff
Cf14 4XW

Telephone: 02920 74 5018
APPENDIX 12: CONSENT FORM

SOUTH WALES DOCTORAL PROGRAMME IN CLINICAL PSYCHOLOGY
CWSR DOCTORIAETH DE CYMRU MEWN SEICOLEG CLINIGOL

CONSENT FORM:

Title of Research Study: Level of symptoms, illness perception and experiential avoidance as predictors of distress in multiple sclerosis

Principal Researcher: James Feeney

Participant name: .................................................................................................................................

Please put your initials in the box if you consent--

1) I confirm that I have read and understood the information sheet for the above study or that the study has been explained to me

2) I understand that participation is voluntary and that I am free to decline participation in the study, without giving any reason and without my care being affected in any way

3) I understand that the data collected in this study will be used anonymously by the researcher as part of the research study, and that I will not be identified in any report of the research project

4) I understand that my file will be accessed at the Helen Durham Centre to access basic demographic information, such as my age, gender, year diagnosed with Multiple Sclerosis (MS), and type of MS, if I have not provided this

5) I agree to take part in the study

Please turn over

V1.1
If you agree with all the above items, please sign, date and print your name in the space provided below.

<table>
<thead>
<tr>
<th>Name of participant</th>
<th>Date</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name of researcher</th>
<th>Date</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX 13: R&D APPROVAL

24 May 2011

Mr James Feeney
Trainee Clinical Psychologist
Cardiff and Vale University Health Board
77 Ty Glas Avenue
Llanishen
Cardiff
CF14 5DX

Dear Mr Feeney

Project ID : 11/MEH/5067 : Level Of Symptoms, Illness Perception And Experiential Avoidance As Predictors Of Distress In Multiple Sclerosis

Further to recent correspondence regarding the above project, I am now happy to confirm receipt of:

- Evidence of favourable opinion from the relevant NHS Research Ethics Committee
- Revised documentation as required by the REC in order to obtain favourable opinion
- Evidence of appropriate informed consent training for the CI

The following amended documentation is approved for use with this study:

<table>
<thead>
<tr>
<th>Document</th>
<th>Version</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invitation Letter</td>
<td>2.1</td>
<td>26/04/11</td>
</tr>
<tr>
<td>Participant Information Sheet</td>
<td>2.1</td>
<td>26/04/11</td>
</tr>
</tbody>
</table>

Please accept this letter as confirmation of sponsorship by Cardiff and Vale UHB and permission for the project to begin.
May I take this opportunity to wish you success with the project, and to remind you that as Principal Investigator you are required to:

- Ensure that all members of the research team undertake the project in accordance with ICH-GCP and adhere to the protocol as approved by the Research Ethics Committee.
- Inform the R&D Office if any external or additional funding is awarded for this project in the future.
- Inform the R&D Office of any amendments relating to the protocol, including personnel changes and amendments to the actual or anticipated start and end dates.
- Complete any documentation sent to you by the R&D Office or University Research and Commercial Division regarding this project.
- Ensure that adverse event reporting is in accordance with the UHB adopted Cardiff and Vale NHS Trust Policy and Procedure for Reporting Research-Related Adverse Events (refs 104 & 174) and Incident Reporting and Investigation (ref 108).
- Ensure that the research complies with the Data Protection Act 1998.
- Ensure that arrangements for continued storage or use of human tissue samples at the end of the approved research project comply with the Human Tissue Act, 2004 (for further information please contact Sharon Orton, HTA Coordinator OrtonS@cf.ac.uk).

If you require any further information or assistance, please do not hesitate to contact staff in the R&D Office.

Yours sincerely,

Professor Jonathan L Bisson
Cardiff and Vale University Local Health Board R&D Director

CC R&D Lead, Prof Nick Craddock
APPENDIX 14: AMMENDED R&D DOCUMENTS:

Tel: 029 20746986  From: Professor JI Bisson
Fax: 029 20745311  R&D Director
CAV_Research.Development@wales.nhs.uk  R&D Office, 2nd Floor TB2

17 June 2011

Mr James Feeney
Trainee Clinical Psychologist
Cardiff and Vale University Health Board
77 Ty Glas Avenue
Llanishen
Cardiff
CF14 5DX

Dear Mr Feeney

Project ID: 11/MEH/5067 : Level Of Symptoms, Illness Perception And Experiential Avoidance As Predictors Of Distress In Multiple Sclerosis

Amendment Date: 16 June 2011

Thank you for notifying the Cardiff and Vale Research Review Service (CaRRS) of this non-substantial amendment.

The documents reviewed were:-

<table>
<thead>
<tr>
<th>Document</th>
<th>Version</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expanded disability status scale: self report</td>
<td>1.2</td>
<td>16/06/11</td>
</tr>
<tr>
<td>Brief illness perception questionnaire</td>
<td>1.1</td>
<td>16/06/11</td>
</tr>
</tbody>
</table>

I can confirm that you may continue with this study accordingly.

Non-substantial amendments do not require approval from a Research Ethics Committee, however please ensure that the appropriate Research Ethics Committee has a copy of this letter for information.
May I take this opportunity to wish you success with the project and remind you that as Principal Investigator you are required to:

- Inform the R&D Office if any external or additional funding is awarded for this project in the future.
- Inform the R&D Office of any further amendments relating to the protocol, including personnel changes and amendments to the actual or anticipated start/end dates.
- Complete any documentation sent to you by the R&D Office regarding this project.
- Adhere to the protocol as approved by the Research Ethics Committee.
- Ensure the research complies with the Data Protection Act 1998.

Yours sincerely,

[Signature]

Professor Jonathan I Bisson
Chair of the Cardiff and Vale Research Review Service (CaRRS)

CC R&D Lead Prof Nick Craddock
APPENDIX 15: ETHICAL APPROVAL:

South East Wales Research Ethics Committee
Sixth Floor, Churchill House
17 Churchill Way
Cardiff CF10 2TW

Telephone: 029 2037 6823

South East Wales Research Ethics Committee - Panel D

Telephone: 02920 376822/6823

12 May 2011

Mr James Feeaney
Trainee Clinical Psychologist
Cardiff and Vale UHB
Archway House
77 Ty Glas Avenue
Llanishen
CF14 5DX

Dear Mr Feeaney

Study title: Level of symptoms, Illness perception and Experiential Avoidance as predictors of distress in multiple sclerosis

REC reference: 11/WA/0082

Thank you for your letter of 27 April 2011, responding to the Committee’s request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Chair, Dr K Craig.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation [as revised], subject to the conditions specified below.

Ethical review of research sites

NHS sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see _3/Conditions of the favourable opinion_4 below).
Non-NHS sites

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

Management permission (_3R&D approval_4) should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements.

Guidance on applying for NHS permission for research is available in the Integrated Research Application System or at http://www.rdforum.nhs.uk.

Where a NHS organisation’s role in the study is limited to identifying and referring potential participants to research sites (_3participant identification centre_4), guidance should be sought from the R&D office on the information it requires to give permission for this activity.

For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.

Sponsors are not required to notify the Committee of approvals from host organisations

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

<table>
<thead>
<tr>
<th>Document</th>
<th>Version</th>
<th>Date</th>
</tr>
</thead>
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<td>Investigator CV</td>
<td>P Moore</td>
<td>18 March 2011</td>
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<tr>
<td>Investigator CV</td>
<td>A Vidgen</td>
<td>18 March 2011</td>
</tr>
<tr>
<td>Investigator CV</td>
<td>J Feeney</td>
<td>18 March 2011</td>
</tr>
<tr>
<td>Letter of invitation to participant</td>
<td>2.1</td>
<td>26 April 2011</td>
</tr>
<tr>
<td>Participant Consent Form</td>
<td>1.1</td>
<td>18 March 2011</td>
</tr>
<tr>
<td>Participant Information Sheet</td>
<td>2.1</td>
<td>26 April 2011</td>
</tr>
<tr>
<td>Protocol</td>
<td>1.1</td>
<td>18 March 2011</td>
</tr>
<tr>
<td>Questionnaire: Background Information Questionnaire</td>
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<td>18 March 2011</td>
</tr>
<tr>
<td>Questionnaire: The Expanded Disability Status Scale: Self Report</td>
<td>1.1</td>
<td>18 March 2011</td>
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<td>Questionnaire: The Brief Illness Perception Questionnaire</td>
<td></td>
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</tr>
<tr>
<td>Questionnaire: General Health Questionnaire</td>
<td>1.1</td>
<td>18 March 2011</td>
</tr>
<tr>
<td>Questionnaire: AAQ-II</td>
<td>IRAS 3.1</td>
<td>11 February 2011</td>
</tr>
<tr>
<td>REC application</td>
<td>CaRRS</td>
<td>25 February 2011</td>
</tr>
<tr>
<td>Referees or other scientific critique report</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response to Request for Further Information</td>
<td>J Feeney</td>
<td>27 April 2011</td>
</tr>
</tbody>
</table>

**Statement of compliance**

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

**After ethical review**

Now that you have completed the application process please visit the National Research Ethics Service website > After Review.

You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the website.

The attached document "After ethical review – guidance for researchers" gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Progress and safety reports
- Notifying the end of the study

The NRES website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

We would also like to inform you that we consult regularly with stakeholders to improve our service. If you would like to join our Reference Group please email referencegroup@nres.npsa.nhs.uk.

**11/WA/0082 Please quote this number on all correspondence**
With the Committee’s best wishes for the success of this project

Yours sincerely

Dr K J Craig
Chair

Email: jagit.sidhu@bsc.wales.nhs.uk

Enclosures: "After ethical review – guidance for researchers" [SL-AR2]

Copy to: R&D Office for Cardiff and Vale ULHB
APPENDIX 16: K-S STATISTIC AND HISTOGRAMS

Tests of Normality

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Kolmogorov-Smirnov(a)</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDSS</td>
<td>.240</td>
<td>.852</td>
</tr>
<tr>
<td>AAQii7item</td>
<td>.159</td>
<td>.897</td>
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<tr>
<td>BIPQtotal</td>
<td>.065</td>
<td>.985</td>
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<tr>
<td>GHQtotal</td>
<td>.126</td>
<td>.845</td>
</tr>
<tr>
<td>Depression</td>
<td>.218</td>
<td>.000</td>
</tr>
</tbody>
</table>

\(a\). Lilliefors Significance Correction

* This is a lower bound of the true significance.

AAQii7item

Histogram

Mean = 19.41
Std. Dev. = 10.60
N = 121
BIPQtotal

Histogram

Mean = 45.53
Std. Dev. = 13.153
N = 121

GHQtotal

Histogram

Mean = 22.63
Std. Dev. = 16.986
N = 121

EDSS
Depression subscale:

APPENDIX 17: SKEWNESS AND KURTOSIS STATISTICS
<table>
<thead>
<tr>
<th></th>
<th>AAQii7item</th>
<th>BIPQtotal</th>
<th>GHQtotal</th>
<th>EDSS</th>
<th>Depression</th>
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</thead>
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<tr>
<td>N Valid</td>
<td>121</td>
<td>121</td>
<td>121</td>
<td>121</td>
<td>118</td>
</tr>
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<td>Missing</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Mean</td>
<td>19.4120</td>
<td>45.6313</td>
<td>32.6550</td>
<td>4.7545</td>
<td>3.6949</td>
</tr>
<tr>
<td>Std. Error of Mean</td>
<td>.99095</td>
<td>1.19616</td>
<td>1.53531</td>
<td>.18097</td>
<td>.31096</td>
</tr>
<tr>
<td>Median</td>
<td>16.0000</td>
<td>46.0000</td>
<td>29.0000</td>
<td>6.0000</td>
<td>2.0000</td>
</tr>
<tr>
<td>Mode</td>
<td>7.00</td>
<td>36.00</td>
<td>14.00</td>
<td>6.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Variance</td>
<td>118.819</td>
<td>173.126</td>
<td>285.217</td>
<td>3.963</td>
<td>11.410</td>
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<td>Skewness</td>
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<td>1.169</td>
<td>-.310</td>
<td>1.203</td>
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<td>.220</td>
<td>.220</td>
<td>.220</td>
<td>.223</td>
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<tr>
<td>Kurtosis</td>
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<td>-.151</td>
<td>.956</td>
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<td>.716</td>
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<td>Std. Error of Kurtosis</td>
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<td>.437</td>
<td>.437</td>
<td>.437</td>
<td>.442</td>
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<tr>
<td>Range</td>
<td>42.00</td>
<td>64.00</td>
<td>77.23</td>
<td>7.00</td>
<td>14.00</td>
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<tr>
<td>Minimum</td>
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<td>11.00</td>
<td>7.15</td>
<td>1.00</td>
<td>.00</td>
</tr>
<tr>
<td>Maximum</td>
<td>49.00</td>
<td>75.00</td>
<td>84.38</td>
<td>8.00</td>
<td>14.00</td>
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<tr>
<td>Percentiles 25</td>
<td>10.5000</td>
<td>36.0000</td>
<td>20.0000</td>
<td>2.1800</td>
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<tr>
<td>50</td>
<td>16.0000</td>
<td>46.0000</td>
<td>29.0000</td>
<td>6.0000</td>
<td>2.0000</td>
</tr>
<tr>
<td>75</td>
<td>26.0000</td>
<td>55.0000</td>
<td>40.5000</td>
<td>6.0000</td>
<td>5.0000</td>
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</table>
APPENDIX 18: 1ST SIMULTANEOUS REGRESSION: EDSS, BIPQ, AAQ7, ONTO GHQ-30

Descriptive Statistics

<table>
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<th></th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>GHQtotallog</td>
<td>1.4773</td>
<td>.20775</td>
<td>121</td>
</tr>
<tr>
<td>EDSSlog</td>
<td>.7325</td>
<td>.16594</td>
<td>121</td>
</tr>
<tr>
<td>BIPQtotal</td>
<td>45.6313</td>
<td>13.15775</td>
<td>121</td>
</tr>
<tr>
<td>AAQ7log</td>
<td>1.2510</td>
<td>.22656</td>
<td>121</td>
</tr>
</tbody>
</table>

Variables Entered/Removed

<table>
<thead>
<tr>
<th>Model</th>
<th>Variables Entered</th>
<th>Variables Removed</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AAQ7log, EDSSlog, BIPQtotal</td>
<td>.</td>
<td>Enter</td>
</tr>
</tbody>
</table>

a. All requested variables entered.
b. Dependent Variable: GHQtotallog

Model Summary

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>Change Statistics</th>
<th>Durbin-Watson</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.788a</td>
<td>.621</td>
<td>.611</td>
<td>.12950</td>
<td>.621</td>
<td>63.938</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), AAQ7log, EDSSlog, BIPQtotal
b. Dependent Variable: GHQtotallog

ANOVA

<table>
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<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
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</thead>
<tbody>
<tr>
<td>1</td>
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<td>.000a</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>117</td>
<td>.017</td>
<td></td>
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<tr>
<td></td>
<td>Total</td>
<td>120</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), AAQ7log, EDSSlog, BIPQtotal
b. Dependent Variable: GHQtotallog
### Coefficients

<table>
<thead>
<tr>
<th>Model</th>
<th>B</th>
<th>Std. Error</th>
<th>Beta</th>
<th>t</th>
<th>Sig.</th>
<th>95.0% Confidence Interval for B</th>
<th>Correlations</th>
<th>Collinearity Statistics</th>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Lower Bound</td>
<td>Upper Bound</td>
<td>Zero-order</td>
</tr>
<tr>
<td>1</td>
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<td>.080</td>
<td>8.745</td>
<td>.000</td>
<td>.542</td>
<td>.859</td>
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<td>EDSSlog</td>
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<td>.088</td>
<td>-.088</td>
<td>-.213</td>
<td>-.284</td>
<td>.064</td>
<td>.287</td>
<td>-.115</td>
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<td>BIPQtotal</td>
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<td>.001</td>
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<td>6.557</td>
<td>.000</td>
<td>.006</td>
<td>.011</td>
<td>.694</td>
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<td>.673</td>
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</table>

*Dependent Variable: GHQtotallog*

### Collinearity Diagnostics

<table>
<thead>
<tr>
<th>Model</th>
<th>Dimension</th>
<th>Eigenvalue</th>
<th>Condition Index</th>
<th>Variance Proportions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>(Constant)</td>
<td>EDSSlog</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>3.916</td>
<td>1.000</td>
<td>.00</td>
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<tr>
<td>2</td>
<td>2</td>
<td>.042</td>
<td>9.656</td>
<td>.16</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>.032</td>
<td>11.121</td>
<td>.02</td>
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<tr>
<td>4</td>
<td>4</td>
<td>.011</td>
<td>19.081</td>
<td>.82</td>
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</tbody>
</table>

*Dependent Variable: GHQtotallog*

### Casewise Diagnostics

<table>
<thead>
<tr>
<th>Case Number</th>
<th>Std. Residual</th>
<th>GHQtotallog</th>
<th>Predicted Value</th>
<th>Residual</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

*Dependent Variable: GHQtotallog*

### Residuals Statistics

<table>
<thead>
<tr>
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<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
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<td>1.8774</td>
<td>1.4773</td>
<td>.16373</td>
<td>121</td>
</tr>
<tr>
<td>Std. Predicted Value</td>
<td>-2.302</td>
<td>2.443</td>
<td>.000</td>
<td>1.000</td>
<td>121</td>
</tr>
<tr>
<td>Standard Error of Predicted Value</td>
<td>.012</td>
<td>.049</td>
<td>.023</td>
<td>.006</td>
<td>121</td>
</tr>
<tr>
<td>Adjusted Predicted Value</td>
<td>1.0879</td>
<td>1.8850</td>
<td>1.4773</td>
<td>.16391</td>
<td>121</td>
</tr>
<tr>
<td>Residual</td>
<td>-3.7132</td>
<td>.40977</td>
<td>.00000</td>
<td>.12787</td>
<td>121</td>
</tr>
<tr>
<td>Std. Residual</td>
<td>-2.867</td>
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<td>.000</td>
<td>.987</td>
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<tr>
<td>Stud. Residual</td>
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</tbody>
</table>

*Dependent Variable: GHQtotallog*
<table>
<thead>
<tr>
<th>Deleted Residual</th>
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<th>.00000</th>
<th>.13249</th>
<th>121</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stud. Deleted Residual</td>
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<td>3.367</td>
<td>-.001</td>
<td>1.018</td>
<td>121</td>
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<tr>
<td>Mahal. Distance</td>
<td>.093</td>
<td>15.938</td>
<td>2.975</td>
<td>2.269</td>
<td>121</td>
</tr>
<tr>
<td>Cook's Distance</td>
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<td>.106</td>
<td>.009</td>
<td>.017</td>
<td>121</td>
</tr>
<tr>
<td>Centered Leverage Value</td>
<td>.001</td>
<td>.133</td>
<td>.025</td>
<td>.019</td>
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</tbody>
</table>

charts

Histogram

Dependent Variable: GHQtotal

Mean = 5.406 ± 1.5
Std. Dev. = 0.997
N = 121

Frequency

Regression Standardized Residual
APPENDIX 19: REGRESSION: EDSS AND BIPQ ONTO AAQ7-II

### Descriptive Statistics

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<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
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<td>1.251</td>
<td>.22656</td>
<td>121</td>
</tr>
<tr>
<td>EDSSlog</td>
<td>.7325</td>
<td>.16594</td>
<td>121</td>
</tr>
<tr>
<td>BIPQtotal</td>
<td>45.6313</td>
<td>13.15775</td>
<td>121</td>
</tr>
</tbody>
</table>

### Correlations

<table>
<thead>
<tr>
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<th>EDSSlog</th>
<th>BIPQtotal</th>
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</thead>
<tbody>
<tr>
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<td>1.000</td>
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<tr>
<td>AAQ7log</td>
<td>.179</td>
<td>1.000</td>
<td>.569</td>
</tr>
<tr>
<td>EDSSlog</td>
<td>.518</td>
<td>.569</td>
<td>1.000</td>
</tr>
<tr>
<td>Sig. (1-tailed)</td>
<td>.025</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>121</td>
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<td>121</td>
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</table>

### Variables Entered/Removed

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<thead>
<tr>
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<th>Variables Entered</th>
<th>Variables Removed</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
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<td>.</td>
<td>Enter</td>
</tr>
</tbody>
</table>

a. All requested variables entered.
b. Dependent Variable: AAQ7log

### Model Summary

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>Change Statistics</th>
<th>Durbin-Watson</th>
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</thead>
<tbody>
<tr>
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<td>.536a</td>
<td>.288</td>
<td>.276</td>
<td>.19282</td>
<td>.288</td>
<td>23.835</td>
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</table>

a. Predictors: (Constant), BIPQtotal, EDSSlog
b. Dependent Variable: AAQ7log
### ANOVA

<table>
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<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
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<td>.886</td>
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<tr>
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<td>Residual</td>
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<td>.037</td>
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<td>120</td>
<td></td>
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a. Predictors: (Constant), BIPQtotal, EDSSlog  
b. Dependent Variable: AAQ7log

### Coefficients

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>95.0% Confidence Interval for B</th>
<th>Correlations</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
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<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td>t</td>
<td>Sig.</td>
</tr>
<tr>
<td>1 (Constant)</td>
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<td>.615</td>
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</table>

a. Dependent Variable: AAQ7log

### Collinearity Diagnostics

<table>
<thead>
<tr>
<th>Model</th>
<th>Dimension</th>
<th>Eigenvalue</th>
<th>Condition Index</th>
<th>Variance Proportions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(Constant)</td>
<td>EDSSlog</td>
<td>BIPQtotal</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>2.939</td>
<td>.01</td>
<td>.00</td>
</tr>
<tr>
<td></td>
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<td>.01</td>
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<tr>
<td></td>
<td>3</td>
<td>.022</td>
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<td>.99</td>
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</table>

a. Dependent Variable: AAQ7log

### Casewise Diagnostics

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<th>Std. Residual</th>
<th>AAQ7log</th>
<th>Predicted Value</th>
<th>Residual</th>
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</thead>
<tbody>
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<td>-.62563</td>
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</table>

a. Dependent Variable: AAQ7log
<table>
<thead>
<tr>
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<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
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<td><strong>Predicted Value</strong></td>
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<td>1.2510</td>
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<td>121</td>
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<tr>
<td><strong>Std. Predicted Value</strong></td>
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<td>.000</td>
<td>1.000</td>
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<tr>
<td><strong>Standard Error of Predicted Value</strong></td>
<td>.018</td>
<td>.062</td>
<td>.029</td>
<td>.008</td>
<td>121</td>
</tr>
<tr>
<td><strong>Adjusted Predicted Value</strong></td>
<td>.8885</td>
<td>1.5629</td>
<td>1.2510</td>
<td>.12241</td>
<td>121</td>
</tr>
<tr>
<td><strong>Residual</strong></td>
<td>- .62563</td>
<td>.44134</td>
<td>.00000</td>
<td>.19120</td>
<td>121</td>
</tr>
<tr>
<td><strong>Std. Residual</strong></td>
<td>-3.245</td>
<td>2.289</td>
<td>.000</td>
<td>.992</td>
<td>121</td>
</tr>
<tr>
<td><strong>Stud. Residual</strong></td>
<td>-3.332</td>
<td>2.317</td>
<td>.000</td>
<td>1.005</td>
<td>121</td>
</tr>
<tr>
<td><strong>Deleted Residual</strong></td>
<td>-.65984</td>
<td>.45233</td>
<td>.00005</td>
<td>.19637</td>
<td>121</td>
</tr>
<tr>
<td><strong>Stud. Deleted Residual</strong></td>
<td>-3.486</td>
<td>2.362</td>
<td>-.001</td>
<td>1.013</td>
<td>121</td>
</tr>
<tr>
<td><strong>Mahal. Distance</strong></td>
<td>.041</td>
<td>11.233</td>
<td>1.983</td>
<td>1.740</td>
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</tr>
<tr>
<td><strong>Cook's Distance</strong></td>
<td>.000</td>
<td>.202</td>
<td>.009</td>
<td>.020</td>
<td>121</td>
</tr>
<tr>
<td><strong>Centered Leverage Value</strong></td>
<td>.000</td>
<td>.094</td>
<td>.017</td>
<td>.014</td>
<td>121</td>
</tr>
</tbody>
</table>

*a. Dependent Variable: AAQ7log*

**Charts**

**Histogram**

*Dependent Variable: AAQ7log*

![Histogram of Regression Standardized Residuals](chart.png)

The histogram shows the distribution of regression standardized residuals with a normal distribution curve. The mean is approximately 0, and the standard deviation is around 1.013.
Partial Regression Plot

Dependent Variable: AAQ7log

R^2 Linear = 0.254
### APPENDIX 20: REGRESSION FOR DEPRESSION MODEL

#### Correlations

<table>
<thead>
<tr>
<th></th>
<th>depression log</th>
<th>EDSSlog</th>
<th>AAQ7log</th>
<th>BIPQtotal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Correlation depression log</td>
<td>1.000</td>
<td>.238</td>
<td>.645</td>
<td>.595</td>
</tr>
<tr>
<td>EDSSlog</td>
<td>.238</td>
<td>1.000</td>
<td>.149</td>
<td>.558</td>
</tr>
<tr>
<td>AAQ7log</td>
<td>.645</td>
<td>.149</td>
<td>1.000</td>
<td>.502</td>
</tr>
<tr>
<td>BIPQtotal</td>
<td>.595</td>
<td>.558</td>
<td>.502</td>
<td>1.000</td>
</tr>
</tbody>
</table>

|                  | depression log | EDSSlog | AAQ7log | BIPQtotal |
| Sig. (1-tailed)  | .            | .005    | .000    | .000      |
| EDSSlog          | .005          | .      | .054    | .000      |
| AAQ7log          | .000          | .054   | .       | .000      |
| BIPQtotal        | .000          | .000   | .000    | .         |

|                  | depression log | EDSSlog | AAQ7log | BIPQtotal |
| N                | 118           | 118     | 118     | 118       |
| EDSSlog          | 118           | 118     | 118     | 118       |
| AAQ7log          | 118           | 118     | 118     | 118       |
| BIPQtotal        | 118           | 118     | 118     | 118       |

#### Variables Entered/Removed

<table>
<thead>
<tr>
<th>Model</th>
<th>Variables Entered</th>
<th>Variables Removed</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BIPQtotal, AAQ7log, EDSSlog</td>
<td></td>
<td>Enter</td>
</tr>
</tbody>
</table>

a. All requested variables entered.
b. Dependent Variable: depression log

#### Model Summary

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>Change Statistics</th>
<th>Durbin-Watson</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>.719</td>
<td>.517</td>
<td>.504</td>
<td>.21351</td>
<td>.517</td>
<td>40.600</td>
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</table>

<table>
<thead>
<tr>
<th>Change Statistics</th>
<th>R Square Change</th>
<th>F Change</th>
<th>df1</th>
<th>df2</th>
<th>Sig. F Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5.552</td>
<td>.000</td>
<td>.046</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), BIPQtotal, AAQ7log, EDSSlog

b. Dependent Variable: depression log

#### ANOVA

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>5.552</td>
<td>3</td>
<td>1.851</td>
<td>40.600</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>5.197</td>
<td>114</td>
<td>.046</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>10.749</td>
<td>117</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), BIPQtotal, AAQ7log, EDSSlog

b. Dependent Variable: depression log
# ANOVA

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Regression</td>
<td>5.552</td>
<td>3</td>
<td>1.851</td>
<td>40.600</td>
<td>.000a</td>
</tr>
<tr>
<td>Residual</td>
<td>5.197</td>
<td>114</td>
<td>.046</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10.749</td>
<td>117</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), BIPQtotal, AAQ7log, EDSSlog

b. Dependent Variable: depression log

# Coefficients

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>Correlations</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td>t</td>
</tr>
<tr>
<td>1 (Constant)</td>
<td>-.556</td>
<td>.136</td>
<td>-4.086</td>
<td>.000</td>
</tr>
<tr>
<td>EDSSlog</td>
<td>-.091</td>
<td>.147</td>
<td>.050</td>
<td>5.36</td>
</tr>
<tr>
<td>AAQ7log</td>
<td>.620</td>
<td>.104</td>
<td>.455</td>
<td>.594</td>
</tr>
<tr>
<td>BIPQtotal</td>
<td>.009</td>
<td>.002</td>
<td>.394</td>
<td>.423</td>
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</tbody>
</table>

a. Dependent Variable: depression log

# Collinearity Diagnostics

<table>
<thead>
<tr>
<th>Model</th>
<th>Dimension</th>
<th>Eigenvalue</th>
<th>Condition Index</th>
<th>Variance Proportions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(Constant)</td>
<td>EDSSlog</td>
<td>AAQ7log</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>3.915</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>.042</td>
<td>9.683</td>
<td>.15</td>
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<tr>
<td>3</td>
<td>1</td>
<td>.032</td>
<td>11.025</td>
<td>.02</td>
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<td>4</td>
<td>1</td>
<td>.011</td>
<td>19.265</td>
<td>.83</td>
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</table>

a. Dependent Variable: depression log

# Residuals Statistics

<table>
<thead>
<tr>
<th>Predicted Value</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std. Predicted Value</td>
<td>-2.201</td>
<td>1.905</td>
<td>.000</td>
<td>1.000</td>
<td>118</td>
</tr>
<tr>
<td>Standard Error of Predicted Value</td>
<td>.020</td>
<td>.082</td>
<td>.038</td>
<td>.010</td>
<td>118</td>
</tr>
<tr>
<td>Adjusted Predicted Value</td>
<td>.0742</td>
<td>.9879</td>
<td>.5672</td>
<td>.21608</td>
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<td>.64870</td>
<td>.0000</td>
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<td>Std. Residual</td>
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<td>.000</td>
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<td>.000</td>
<td>1.004</td>
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</tbody>
</table>
Charts

Histogram

Dependent Variable: depression log

Mean = -1.77E-16
Std Dev = 0.987
N = 118
Normal P-P Plot of Regression Standardized Residual
Dependent Variable: depression log

Scatterplot
Dependent Variable: depression log

Regression Standardized Residual vs. Regression Standardized Predicted Value

R² Linear = 0
APPENDIX 21: POST HOC ANALYSIS:

### Model Summary

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>Change Statistics</th>
<th>Durbin-Watson</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R Square Change</td>
<td>F Change</td>
</tr>
<tr>
<td>1</td>
<td>.785(^a)</td>
<td>.616</td>
<td>.610</td>
<td>.12982</td>
<td>.616</td>
<td>94.667</td>
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</table>

\(^a\) Predictors: (Constant), BIPQtotal, AAQ7log

b. Dependent Variable: GHQtotallog

### ANOVA

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
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</thead>
<tbody>
<tr>
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<td>1.595</td>
<td>94.667</td>
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<tr>
<td></td>
<td>Residual</td>
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<td>.017</td>
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<td></td>
<td>Total</td>
<td>5.179</td>
<td>120</td>
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\(^a\) Predictors: (Constant), BIPQtotal, AAQ7log

b. Dependent Variable: GHQtotallog

### Coefficients

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>Correlations</th>
<th>Tolerance</th>
<th>VIF</th>
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<tr>
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<td>Std. Err</td>
<td>Beta</td>
<td>t</td>
<td>Sig.</td>
</tr>
<tr>
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<td>.472</td>
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\(^a\) Dependent Variable: GHQtotallog