

The Pennsylvania State University

The Graduate School

College of the Liberal Arts

**ATTRIBUTIONAL STYLE IN MULTIPLE SCLEROSIS:
EXAMINING THE LEARNED HELPLESSNESS MODEL IN A CHRONICALLY ILL
POPULATION**

A Thesis in

Psychology

by

Gray A. Vargas

© 2010 Gray A. Vargas

Submitted in Partial Fulfillment
of the Requirements
for the Degree of

Master of Science

December 2010

The thesis of Gray A. Vargas was reviewed and approved* by the following:

Peter A. Arnett
Associate Professor of Psychology
Thesis Adviser

Frank Hillary
Associate Professor of Psychology

Karen Gasper
Associate Professor of Psychology

Melvin M. Mark
Professor of Psychology
Head of the Department of Psychology

*Signatures are on file in the Graduate School.

ABSTRACT

If cognitive factors could be identified that explain additional variance in depression in the Multiple Sclerosis (MS) population, they would represent a promising target for treatment and prevention of depression in MS. The learned helplessness model states that in certain individuals, uncontrollable negative events lead to a depressogenic attributional style, which leads to depression after future uncontrollable events. In addition, the specific vulnerability theory states that the attributions and negative events must be in the same domain. This theory has barely been studied in MS. Disease-related helplessness has also been shown to be associated with depression and to interact with attributional style, but there are mixed findings as to whether perceived control over illness is adaptive. The proposed study differentiated MS-related and non-MS-related attributional style, and analyzed them along with disease-related helplessness in an attempt to determine whether the learned helplessness theory or the specific vulnerability theory apply to this population. 52 MS patients and 49 controls were included in this study. Participants were given the Attributional Style Questionnaire (ASQ) as well as disability and depression measures. The majority of causes listed on the ASQ were non-MS related, and more disabled and helpless participants listed more MS-related events. In patients, non-MS-related attributional style correlated with both stress and depression, but MS-related attributional style did not correlate with either disability or depression. Stress mediated the effect of non-MS-related and overall attributional style on depression. These results suggest that attributional style is an important construct in depression in MS; however, attributional style does not appear to lead directly to depression but instead to more perceived stress, which in turn leads to increased depression. Additionally, attributions seem to operate differently when they are illness vs. non-illness-related.

TABLE OF CONTENTS

LIST OF TABLES.....	v
LIST OF FIGURES.....	vi
ACKNOWLEDGMENTS.....	ix
Chapter 1. INTRODUCTION.....	1
The population and problem.....	2
Learned Helplessness and Specific Vulnerability.....	3
Past Findings.....	4
Disease-Related Helplessness and Perceived Control over Illness.....	4
Hypotheses.....	7
Chapter 2. METHODS.....	8
Measures.....	8
Participants.....	11
Data Pre-processing.....	12
Chapter 1. RESULTS.....	15
Descriptive Analysis of ASQ Data.....	15
Correlational Analysis.....	17
Mediation/Moderation Models.....	18
Chapter 1. DISCUSSION.....	26
Summary of Findings.....	26
Comparison with Past Findings.....	29
Interpretations of Results.....	30
Clinical Implications.....	36
Limitations.....	37
Summary and Recommendations.....	38
REFERENCES.....	40
Appendix A: Attributional Style Questionnaire (ASQ).....	52
Appendix B: Multiple Sclerosis Attitudes Index (MSAI).....	56
Appendix C: Chicago Multiscale Depression Inventory (CMDI).....	57
Appendix D: Beck Depression Inventory- Fast Screen (BDI-FS).....	58
Appendix E: The Hassles and Uplifts Scale.....	59
Appendix F: Coding Instructions for Attributional Style Questionnaire.....	62
Appendix G: Causes listed by patients on the ASQ.....	63
Appendix H: Courses of patients listing none or one or more MS-related causes on the ASQ.....	70
Appendix I: Distributions of internal attributions (MS and non-MS-related).....	71
Appendix J: Mediation models.....	72

LIST OF TABLES

Table 1. Demographics and Relevant Variables in Patients and Controls.....	15
Table 2. Correlations between Depression and Demographic and Disease Variables in Patients.....	18
Table 3. Correlations between Relevant Variables in Patients.....	20

LIST OF FIGURES

Figure 1. Proposed model.....	7
Figure 2. Types of causes listed by patients.....	17
Figure 3. Significant Correlations, Controls.....	19
Figure 4. Significant correlations, patients- attributional style divided.....	20
Figure 5. ASQ dimensional scores for MS and Non-MS related events- Correlations with Depression.....	21
Figure 6. Correlations with overall attributional style and stress, patients.....	22
Figure 7. Correlations with overall attributional style and disability, patients.....	22

ACKNOWLEDGMENTS

Many thanks to Peter Arnett, Frank Hilary, Karen Gasper, Amy Marshall, Fiona Barwick, Dede Ukueberuwa and Amanda Rabinowitz for their feedback and support during this process!

Thanks also to Kelly Parker-Maloney, Michael Szedlmayer and my parents for their encouragement, patience, and support.

Chapter 1.

INTRODUCTION

The population and problem

Multiple Sclerosis (MS) is a chronic, unpredictable, and degenerative disease of the central nervous system that currently affects approximately 400,000 Americans (Grima et al., 2000), most of whom are diagnosed between the ages of 20 and 30. In MS, the immune system destroys myelin, the fatty tissue surrounding axons. Myelin facilitates neuronal signaling and when it is destroyed neural transmission is significantly slowed, resulting in symptoms that include physical, cognitive, and emotional impairments. Some of the most common symptoms of MS include fatigue, weakness and numbness in the limbs, loss of bowel and bladder control, sexual dysfunction, pain, cognitive dysfunction, loss of eyesight and balance, and mood disorders (Goodkin, 1992; Mohr & Dick, 1998).

The most common mood disorder in MS is depression, with lifetime prevalence estimated to be approximately 50% (Patten & Metz, 1997; Sadovnick et al., 1996). This prevalence rate is higher than that found in the general population and most other chronic medical diseases (Wells et al., 1988). The etiology of depression in MS remains unclear. Pathophysiological factors, such as lesion burden, brain atrophy, and immunological anomalies, are associated with depression in MS but explain only a limited proportion of variance (Feinstein et al., 2004). Secondary disease sequelae such as physical disability, fatigue, pain and cognitive dysfunction, which have also been associated with depression, have demonstrated inconsistent or weak relationships (Arnett et al., 2008). Most studies have found that risk for depression follows the onset of MS (Joffe et al., 1987; Minden et al., 1987; Sadovnick et al., 1996; Sullivan et al., 1995), but it remains unclear what combination of factors is most important when predicting

depression. A recent model constructed by Arnett and colleagues (2008) proposes that factors such as conceptions of self and illness might moderate the effect of disease sequelae on depression in MS and help explain the inconsistencies in the literature. These conceptions could include cognitive schemas, attributions for negative events, negative outcome expectancies, and poor personal control.

Studies have shown that cognitive therapy can effectively change such cognitive factors (DeRubeis & Hollon, 1995; Peterson et al., 1982; Seligman et al., 1988). Even the best treatment outcome studies for depression in MS suggest that available pharmacologic and psychotherapeutic interventions are effective in only 50% of MS patients (Ehde et al., 2008; Mohr et al., 2001). Therefore, if research can identify cognitive factors that explain additional variance in depression, they would represent a much-needed target for treatment and prevention.

Learned Helplessness and Specific Vulnerability

One major theory describing how cognitive factors can lead to depression in healthy individuals is the learned helplessness theory. According to this theory, if an individual experiences uncontrollable negative events and then makes certain kinds of attributions about those events, the individual will both expect such uncontrollable negative events to occur in the future and will become helpless and depressed when they do occur (Abramson et al., 1978). The attributions which lead to such cognitive vulnerability are described as depressogenic and are thought to be internal, stable, and global. Thus, a person with depressogenic attributional style perceives negative uncontrollable events as arising from personal factors (internal), as persisting for a long period of time (stable), and as being present in all situations (global). A depressogenic attributional style represents a cognitive vulnerability for depression and must be present along with negative events to produce depression. Although data on the causal relationship between

attributional style and depression are mixed, most researchers agree that there is a significant predictive relationship (Alloy et al., 1997; Alloy et al., 1999; Alloy & Clements, 1998; Barnett & Gotlib, 1988; Dixon & Ahrens, 1992; Fresco et al., 2006; Lau & Eley, 2008; Metalsky et al., 1987; Metalsky et al., 1993; Metalsky & Joiner, 1992; Nolen-Hoeksema et al., 1992; Sweeney et al., 1986).

In studies of the learned helplessness theory, it has been suggested that individuals have a specific vulnerability—meaning that their attributional style and the experienced negative events must be in the same domain (Abramson et al., 1989). Thus, for example, depressogenic attributional style in an affiliative domain will only lead to depressed mood when an individual experiences a negative affiliative event. This idea is consistent with Beck's theory that early experiences lead to certain cognitive schemas, which are later activated only by *analogous* experiences (Beck, 1967). This idea, referred to as the specific vulnerability theory, has received partial support in research looking at two domains—affiliative and achievement-related events (Abela & Seligman, 2000; Metalsky et al., 1987). Researchers have called for moving beyond these two domains and taking a more individualized approach to creating and investigating possible domains related to attributional style (Abela et al., 2004).

Learned Helplessness and Specific Vulnerability in MS

MS is an ideal model for studying learned helplessness because the disease, particularly the relapsing-remitting and progressive-relapsing subtypes, involves repeated unpredictable and relatively uncontrollable periods of symptom exacerbation that can be highly distressing.

However, the disease also involves chronic symptoms and stressors and it is less clear how this type of stress would interact with attributional style to predict depression. Perhaps because of this, little research on learned helplessness has been conducted with MS patients.

Past Findings

The few studies on attributional style and depression in MS have yielded some consistent results. In a study of 55 patients, Barrett (1992) found that depression correlated with global attributional style for general and MS-related negative events. Internal and stable attributions were not related to depression. Furthermore, general and MS-related stress did not interact with attributional style to predict an increase in hopelessness at a later time point. This is the only study found to date that separated MS and non-MS related attributional style. Johnson and colleagues (2001) studied 16 MS patients and found that they had significantly lower global attributions for positive events and significantly higher stable attributions for negative events compared to controls. Kneebone and Dunmore (2004) surveyed 495 patients and found that depression correlated with global and stable attributions for negative events. Additionally, general and MS-related stress interacted with attributional style to predict depression cross-sectionally. In summary, attributional style does appear to be associated with depression in MS patients, with global and stable dimensions most consistently related.

Disease-Related Helplessness and Perceived Control over Illness

A recent reformulation of the learned helplessness theory emphasizes the moderating influence of perceived control (Peterson et al., 1993). Several studies with MS and other chronically ill populations have shown that perceptions of disease-related helplessness and its converse, perceptions of control over illness, are related to depression. Shnek and colleagues (1995, 1997) found that perceptions of MS-related helplessness explained a significant amount of variance in depression after controlling for demographic and disease-related factors. Jopson and Moss-Morris also found that MS patients' illness representations, which include perceived illness control, significantly predicted depression and self-esteem beyond disease-related factors

(Jopson & Moss-Morris, 2003). Finally, van der Werf and colleagues (2003) found that MS-related helplessness mediated the relationship between neurological impairment and depression.

Studies on patients with Rheumatoid Arthritis (RA), a chronic disease with unpredictable symptom exacerbations, have also suggested that perceived control mediates the relationship between disease factors and depression. In two studies, increased self-efficacy over daily symptoms—or the belief that one has the power to effectively manage their symptoms—was found to be related to depression (Parker et al., 1989) and even mediate the relationship between pain and depression (Schiaffino et al., 1991). Finally, Chaney and colleagues (1996) found that attributional style and perceived illness control in RA patients predicted depression after controlling for disease variables and disease-related helplessness. Although controlling for helplessness makes the results difficult to interpret, the study found that internal and global attributions for negative events were associated with increased depression only under conditions of decreased perceived illness control. Schiaffino and Revenson (1992) also found that when perceived RA controllability or self-efficacy was low, depressogenic attributions (internal, stable, and global) for the cause of a symptom flare (a disease-related event) were associated with increased depression. Thus, perception of control over illness is related to depression in MS and RA, and seems to moderate the effect of attributional style on depression.

While some studies have found perceived illness control to be associated with lower depression (Jopson & Moss-Morris, 2003) and other positive disease outcomes (Lasar & Kotterba, 1993; Lasar & Kotterba, 1997; Riazi et al., 2004; Wassem, 1991), there is debate as to whether perceived control is adaptive. Some studies have found no relationship between perceived illness control and adjustment outcome (Hickey & Greene, 1989; MacLeod & MacLeod, 1998; Marks & Millard, 1990). Others argue that perceived controllability is only

adaptive for aspects of illness that are actually controllable or if their disease has been controllable in the past. For example, two studies have found that patients with RA who perceived greater control over their symptoms had less mood disturbance, more positive affect, and better adjustment whereas those who perceived greater control over their *disease course* had more mood disturbance and worse adjustment (Affleck et al., 1987; Schiaffino & Revenson, 1992). Finally, Christensen and colleagues (1991) found that a history of a more uncontrollable disease interacts with perceived control—specifically, they found that hemodialysis patients with a history of uncontrollable disease who had higher perceived illness control were more depressed, while those with no history of uncontrollable disease who had higher perceived illness control were less depressed.

In summary, much of the existing research has shown that perceived illness control and disease-related helplessness predict depression above disease factors and might even mediate the relationship between these factors and depression. Furthermore, the inconsistent findings on attributional style in MS may be due to the moderating effect of perceived illness control as described above (Chaney et al., 1996; Schiaffino & Revenson, 1992). The lack of differentiation between illness-related and non-illness-related attributions in most studies might also explain the mixed findings. Attributional style might operate in a unique way when individuals have a chronic illness, and attitudes related to illness might operate differently than those unrelated to illness. The proposed study will attempt to differentiate illness and non-illness related attributional style, and examine these in conjunction with perceived illness control in an attempt to clarify whether the learned helplessness model is valid in this population.

Hypotheses

As learned helplessness theory suggests, I propose that negative events will lead to depression if patients attribute these events to internal, stable and global causes. However, I also propose that the specific vulnerability hypothesis will apply to the illness and non-illness domains. Therefore, illness-related negative events will lead to depression through illness-related attributional style and non-illness-related negative events will lead to depression through non-illness-related attributional style. In this study, illness-related negative events will be conceptualized as level of disability, and non-illness-related negative events will be conceptualized as intensity of daily hassles. Both types of negative events are chronic, highly stressful, and relate to multiple life domains, thus making them more comparable. Furthermore, in the illness domain, perceived illness control is expected to moderate the relationship between attributional style and depression, such that depressogenic attributions for MS-related causes will be associated with depression only in the context of low perceived illness control (see Figure 1).

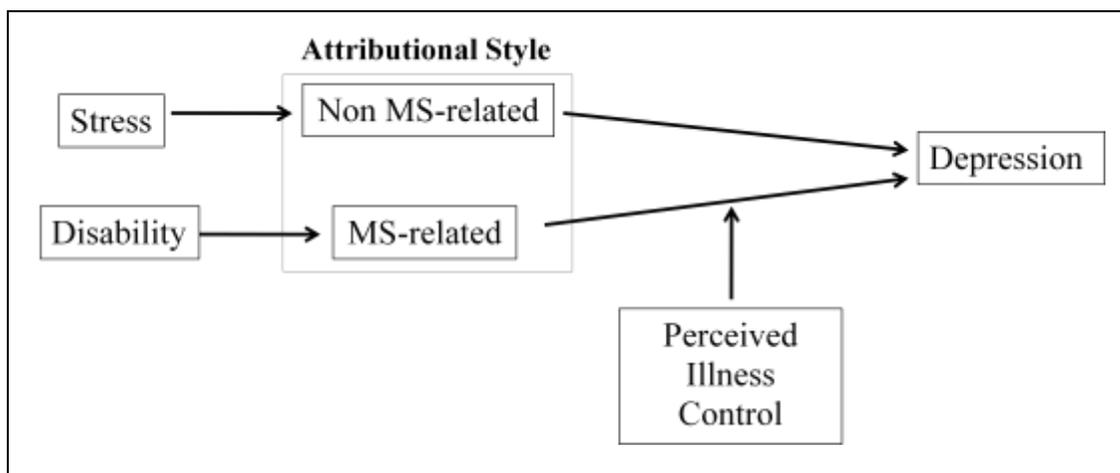


Figure 1. Proposed model

These hypotheses assume that the learned helplessness model is applicable to a

chronically ill population. The model also assumes that both illness-related and non-illness-related pathways lead to depression in individuals with MS, although both pathways do not have to be active concurrently. Depending on the individual, one pathway alone might be sufficient to produce depression.

Chapter 2.

METHODS

Measures

Attributional Style Questionnaire (ASQ). The ASQ was constructed in 1982 by Peterson and colleagues. The original version includes 12 hypothetical events—six positive and six negative (see Appendix A). However, only the negative events will be examined in the current study. The events included in the questionnaire include: not being able to find a job, not helping a friend that comes to you for help, giving a talk that the audience reacts negatively to, a friend acting hostilely towards you, not being able to get all your work done, and going on a date that goes badly. For each event, the participant is instructed to write down one major cause. The individual then rates from 1 to 7 how internal, stable, and global that cause is.

The ASQ has been shown to have a Cronbach's alpha of .72 and a test-retest reliability of .64 for composite scores of negative events (Peterson et al., 1982). The test-retest reliabilities for each dimension are .64, .69, and .57 for the internal, stable, and global dimension, respectively (Peterson et al, 1982). Since attributional style has not been thoroughly studied in the MS population and since there is support for examining the individual contribution of each attribution dimension to depression (Brown & Siegel, 1988), data for all three dimensions will be

collected and analyzed. Also, since composite scores of all three dimensions have been shown to be more reliable than each dimension separately, composite scores will also be analyzed (Sweeney et al., 1986).

Multiple Sclerosis Attitudes Index (MSAI). The MSAI is based on the 5-item Arthritis Helplessness Index which was designed to measure helplessness in individuals with RA (Stein et al., 1988a,b). Shnek et al (1997) modified the measure by replacing the word “arthritis” with “MS” (see Appendix B). This revised measure has been shown to have a Cronbach’s alpha of .68 in MS patients (Shnek et al., 1997) and has been shown to correlate significantly with depression in these patients (Kneebone et al., 2003). Disease-related helplessness is thought of as the opposite of perceived illness control, and the two concepts will be used interchangeably in this paper.

Chicago Multiscale Depression Inventory (CMDI). The CMDI is a 42-item self report measure that was designed specifically to measure depression in chronically ill populations (see Appendix C). This measure consists of mood (i.e. sad, glum), evaluative (i.e. a failure, useless), and vegetative (i.e. sluggish, unable to concentrate) scales of 14 items each. Examinees rate on a scale of 1-5 the extent to which each word or phrase describes them during the past week, including today, where 1 is “Not at All” and 5 is “Extremely.” Higher scores on the CMDI indicate higher levels of depression. The CMDI has been found to be a valid and reliable measure of depression in MS patients—with a Cronbach’s alpha of .82 and .95 for the mood and evaluative scales, respectively (Chang et al., 2003; Nyenhuis et al., 1998). To eliminate confounds between MS symptoms and vegetative depressive symptoms, and in order

to follow the recommendation of Nyenhuis et al (1995) and the precedent of earlier work (Arnett et al., 1999a; Arnett et al., 1999b; Beeney & Arnett, 2008), only the mood and evaluative subscales will be included in the analyses.

In order to more thoroughly measure depression, the Beck Depression Inventory-Fast Screen (BDI-FS) will also be used (see Appendix D). This measure consists of seven items from the BDI-II and has been shown to be a quick and reliable measure of depression with concurrent and discriminant validity in the MS population (Benedict et al., 2003; Strober & Arnett, 2009).

Multiple Sclerosis Functional Composite (MSFC). The MSFC is a performance-based measure of disability that was chosen for this study because it provides a much more comprehensive measure of disability than what is commonly used in MS studies—since it includes upper extremity motor functioning and cognitive functioning, along with the lower extremity motor functioning that is usually measured. Additionally, neurologists do not need to administer the measure, and trained researchers have been shown to have high intra and inter-rater reliability (Fischer et al., 2001). The MSFC involves a timed 25-foot walk, the 9-hole peg task, and the Paced Auditory Serial Addition Task. Z scores will be created for each task relative to published norms (Fischer et al., 2001) and averaged to create a composite score. The MSFC has also been shown to have concurrent and predictive validity and to be more sensitive than other disability measures to decline over time (Fischer et al., 1999). For these reasons, it was recently recommended that the MSFC be used in all future clinical trials (Rudick et al., 1997). In order to facilitate comparison with other studies and to more thoroughly measure disability, the Expanded Disability Status Scale (EDSS) will also be used, which is a commonly-used neurologist-rated disability measure based on ambulation and neurologic symptoms.

Hassles and Uplifts Scale (HUS). The Hassles and Uplifts Scale is a measure of everyday stressors and positive experiences designed for a middle-aged population. Participants rate 53 items on a 4-point scale ranging from 0 (none or not applicable) to 3 (a great deal) based on the past month (see Appendix E). Each item is rated based on the degree to which it has been a hassle, as well as the degree to which it has been an uplift. Items are words or phrases and address various life domains including work, family, and finances. The measure was designed to capture daily stressors as well as more momentous negative life events. Frequency of hassles has been shown to correlate with frequency of negative life events and to be relatively stable over time ($r=.79$) (Kanner et al., 1981). In order to mirror the disability measure, only the summed hassles score will be used to address the primary hypotheses. Follow-up analyses will also be conducted to assess the possible offsetting effect of uplifts, using a hassles minus uplifts score (referred to in this paper as relative hassles). Also, in this paper the terms “stress” and “hassles” will be used interchangeably.

Participants

Participants included 56 MS patients and 51 healthy controls. They were recruited through advertising in a newsletter, recruitment from MS support groups in the central Pennsylvania area, and flyers distributed in the State College (PA) community. All MS patients were diagnosed with definite or probable MS by a board-certified neurologist according to accepted research protocols (Lublin & Reingold, 1996; McDonald et al., 2001). In order to retain as many patients as possible and to best represent the MS population, all course types were included. Participants were excluded if they had any of the following: (a) history of neurological disease other than MS, (b) history of drug or alcohol abuse, (c) history of developmental learning

disability, (d) visual or motor disturbances that would prohibit testing without significant alteration of testing procedures, or (e) a clinical exacerbation less than four weeks before the study. Graduate students trained by a clinical neuropsychologist administered the tests.

Participants were given 100 dollars as compensation for testing. Informed consent was obtained for all participants, and the study was approved by the Behavioral Committee of the University Institutional Review Board at the Pennsylvania State University.

Data Pre-processing

Data first were inspected for missing values, and only individuals missing less than half of each of their questionnaires were included in the analyses. Per Nyenhuis and colleagues' (1995) recommendation, the CMDI mood and evaluative scores were averaged and converted to t scores using Nyenhuis' healthy controls as the reference point. Three trained research assistants, blinded to patient status, coded the causes listed on the ASQ as MS-related or non-MS-related. They were given detailed coding instructions, including a list of common MS symptoms (see Appendix F). The three coders' data were compared to a rating completed by a clinical neuropsychologist and researcher specializing in MS, also blinded to patient status. If the code given by two out of the three research assistants was the same as the code given by the neuropsychologist, this code was used. If not, the neuropsychologist's code was used. For the twenty-five foot walk, three participants were in wheelchairs and unable to complete the test, so they were given a score of one second longer than the longest time recorded (20 sec). This approach has been used in past studies (Arnett, Higginson, Voss, Wright, Bender, Wurst & Tippin, 1999; Dikmen, Machamer, Winn & Temkin, 1995). Two participants who used a cane were not tested, and they were given the average score of the four participants who were tested and used canes (10.57 sec). One item on the MSAI was reverse-scored. MSFC Z scores were

flipped so that higher scores on this and all variables indicate more pathology.

Data Clean-Up

Missing Data Analysis. Fifty-six MS patients were administered the measures listed. All data was reliability checked by a trained research assistant. Three patients were missing half or more of the ASQ (two refused to complete the measure and one attempted the measure but did not answer a sufficient number of items due to confusion about the instructions). Two of these patients were female and one was male, ages 45, 52, and 34 with EDSS's of 3.0, 3.5 and 6.5 respectively. These participants were excluded in order to ensure that ASQ composite scores were based on an adequate amount of data. These excluded participants differed from the included participants on sex (were more male), MSFC (were more disabled), BDI-FS (were more depressed), and relative hassles (had relatively more uplifts). See discussion section for further discussion of these differences.

Out of the remaining 53 patients, 3% of the ASQ data was missing overall, with an average of .52 items missing for all patients and a maximum of six items missing (out of 18) for each individual patient. Five patients were missing three items and two patients were missing six items. Analyses revealed that these data were missing at random (Little's MCAR test: $\chi^2 = 85.8$, $df=84$, $p=.425$). Since ASQ composite scores were generated using averages, these data were not prorated. Twenty-five people listed no MS-related events for the ASQ, so they did not have any MS-related scores on the ASQ. These participants had an average age of 51 and an average EDSS of 3 (ranging from 0 to 6.5). One person listed only MS-related events, so he did not have any non-MS related scores (51 y.o. male, EDSS=6, with progressive relapsing course).

No data were missing from the MSFC. One patient was missing one item on the MSAI and two patients were missing one item on the CMDI; these scores were prorated. Twelve

individuals were missing one or more items on the HUS, with an average of 1.8 items missing and a maximum of 43 missing; these scores were also prorated. Overall, three percent of both the hassles and uplifts data were missing, and these data were missing at random (Little's MCAR test: $\chi^2=662.259$, $df=710$, $p=.899$).

Outlier Analysis. One patient was found to be a univariate outlier on the CMDI (z score=4.6, relative to patients). This patient, a 54-year old woman with a relapsing-remitting course and an EDSS of 7.5, was excluded from analyses (leaving 52 patients). One control subject, a 67-year-old woman, was also an outlier on the CMDI (z score=4.8, relative to controls) and Hassles total (z=3.6) and so was excluded. Another control subject, a 62-year-old female, was an outlier on the BDI-FS (z score=3.5) and so was also excluded (leaving 49 controls). No other patients or controls had z scores greater than 3.29 on any measure (Tabachnick & Fidel, 2000).

Skewness Analysis. The CMDI was found to be positively skewed for both the patients (Skewness=1.28, SD=.33) and controls (Skewness=1.38, SD=.34). Therefore, a negative inverse transformation was used for these scores. This method was used since a log and square root transformation did not resolve the skewness. The MSAI was found to be borderline skewed for patients (Skewness=1.116, SD=.33). However, these data were not transformed since it was only slightly above the suggested cut-off of Skewness/SD=3.33 (Tabachnick & Fidel, 2000) and the histogram revealed that the skewness was being driven by two participants with high scores. The BDI-FS was found to be positively skewed for the controls (Skewness=1.34, SD=.34), and so was transformed using a square root function. All of the kurtosis values were within an acceptable range.

Chapter 3.

RESULTS

Table 1. Demographics and Relevant Variables in Patients and Controls

	Patients Mean(SD)	Controls Mean(SD)
Age	52.0 (9.5)	45.37 (10.0)**
Education (yrs)	14.8 (2.0)	15.7 (2.4)*
ASQ Total	4.4 (.8)	3.7 (.69)***
CMDI (t-score)	48.6 (8.4)	44.6 (4.3)**
BDI-FS	4.5 (2.0)	.73 (1.2)***
Symptom duration (yrs)	18.1 (9.2)	--
Diagnosis duration (yrs)	14.9 (8.2)	--
EDSS	4.0 (2.0)	--
MSAI	11.6 (4.1)	--

Significant group differences indicated; *: $p < .05$; **: $p < .01$; ***: $p < .001$

See Table 1 for relevant patient and control demographic and disease-related information.

All patients and controls were Caucasian. Forty-five patients (86%) were female, and seven were male. Forty-one controls (84%) were female and eight were male. Thirty-two patients (61%) had a relapsing-remitting course, 13 (25%) had a secondary progressive course, 4 (8%) had a primary progressive course, and 3 (6%) had a progressive relapsing course. 27 patients (52%) were currently working.

Descriptive Analysis of ASQ Data

An average of 22% of causes listed were judged to be MS-related (range 8-53%). (See Appendix G for a list of all causes given by patients, listed by event.) Patients listed the most MS-related causes (53%) for event five- not being able to get the work done that is expected of you (see Figure 2) and the second most for not being able to find a job (25%). For all events

except event five, chi square tests were significant, indicating that event five was the only event that did not have a proportion of MS-related causes that was significantly different from 50%. Analysis was also done comparing the proportion of MS-related causes across the different events, and this showed that the distributions were significantly different (Related-Samples Friedman's Two-Way Analysis of Variance by Ranks, $p < .001$).

The number of causes a participant reported that were MS-related, and the proportion of their events that were MS-related, correlated significantly with the EDSS, MSFC, and MSAI (all positively). The number of MS-related causes also correlated with attributional style and marginally correlated with stress ($p < .10$) but did not correlate with depression. When patients who listed no MS-related causes were compared to those reporting one or more MS-related cause, the group who listed MS-related causes had greater disability and disease-related helplessness, more depressogenic attributional style overall, more internal and global attributions, and marginally more stable attributions. The groups also differed in their distributions of course types (see Appendix H) with the group listing MS-related causes having patients with relatively more secondary progressive and primary progressive courses (Independent Samples Mann Whitney Test, $p < .05$).

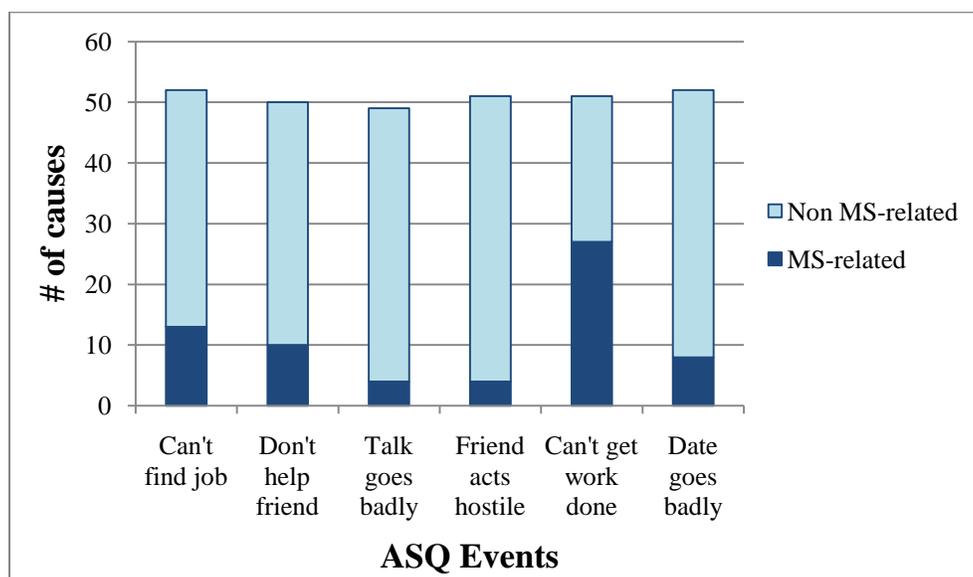


Figure 2. Types of causes listed by patients.

Correlational Analysis

Correlations were calculated among demographic and disease variables and depression (see Table 2). Both depression measures correlated with symptom and diagnosis duration (see bold in Table 2) as well as the EDSS and MSFC (see Table 3). Therefore, diagnosis duration and MSFC were controlled for in all non-illness related regression analyses. Diagnosis duration was chosen instead of symptom duration since it correlated more highly with depression, is more objective, and is very highly correlated with symptom duration (.87). MSFC was chosen instead of EDSS since it is more highly correlated with depression, more comprehensive, and highly correlated with the EDSS (.58). These variables were not controlled for in illness-related regressions since disability is a variable of interest in these regressions and thus would remove meaningful variance. Additionally, a t-test was performed to compare depression and attributional style between patients with relapsing-remitting and progressive relapsing courses (the two most prevalent course types). These variables did not differ across these two course

types.

Table 2.

Correlations between Depression and Demographic and Disease Variables in Patients

	Age	Sex	Symp Dur	Diag Dur	Educ	CMDI	BDI-FS
Age	1	.16	.53**	.52**	.00	.08	.24
Sex		1	.26	.16	-.16	-.00	.04
Symp Dur			1	.87**	-.09	.27*	.30*
Dx Dur				1	.03	.31*	.38**
Educ					1	-.15	-.15
CMDI						1	.37**
BDI-FS							1

*: $p < .05$; **: $p < .01$

A correlation matrix was also constructed comparing the disability measures (MSFC and EDSS), depression measures (CMDI and BDI-FS), stress measures (hassles score and hassles and uplifts difference), and cognitive measures (ASQ and MSAI) (see Table 3). No correlations were greater than .9 so multicollinearity was not suspected (Tabachnick & Fidel, 2000). Correlations were examined between the variables that make up the proposed pathways leading to depression, first in controls.

For controls, overall attributional style (an average of internal, stable and global attributions for all events) did not correlate with either stress or depression, but stress did correlate with depression (hassles correlated with both the CMDI (.45, $p < .01$) and the BDI-FS (.55, $p < .001$)) (see Figure 3). However, when examining only the stable and global dimensions, ASQ correlated with both stress measures (hassles (.32, $p < .05$) and relative hassles (hassles uplifts difference) (.39, $p < .01$)) but not with depression.

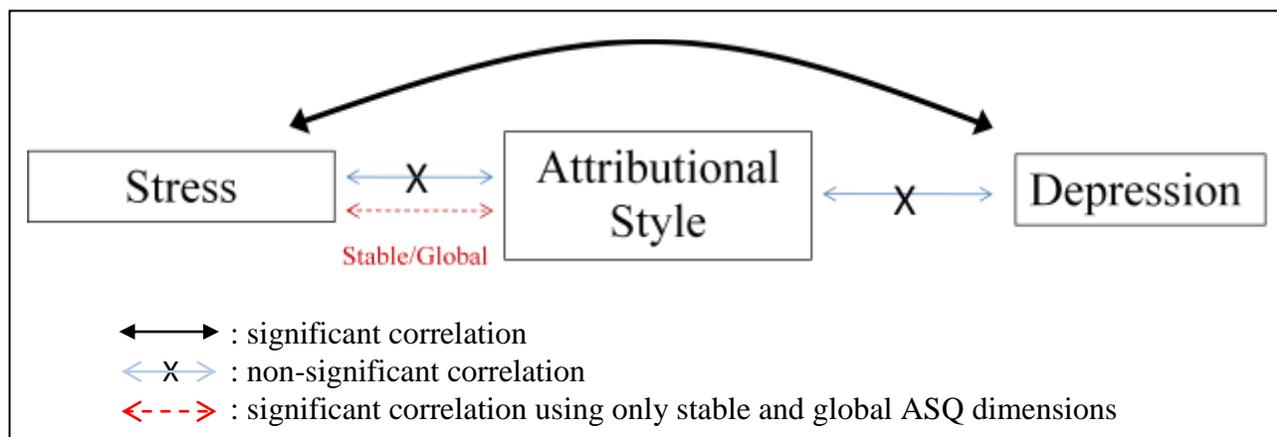


Figure 3. Significant Correlations, Controls

Then, correlations were tested in patients, examining both the illness-related and non-illness-related pathways. After separating attributional style into MS-related and non-MS related events, non-MS related attributional style correlated with stress and one depression measure (CMDI) (see Table 3 and Figure 4). MS-related attributional style correlated with one stress measure (relative hassles) (see dotted black arrow in Figure 4) but did not correlate with disability, depression, or the MSAI. MS-related attributional style was not expected to correlate with stress. MS-related helplessness was correlated with one depression score (BDI-FS). When only stable and global dimensions were averaged, MS-related ASQ correlated with MS-related helplessness, but not disability or depression.

Table 3.
Correlations between Relevant Variables in Patients

	---Depression---	---Disability---	---Stress---	---Attributional Style---	---Help---					
N=52	CMDI	BDI-FS	EDSS	MSFC	Hassles	Hass-Upl	ASQ Total	ASQMS	ASQ nonMS	MSAI
CMDI	1	.371**	-.06	.17	.41**	.33*	.24	-.06	.31*	.09
BDI-FS		1	.29*	.43**	.55**	.36**	.21	.09	.22	.48***
EDSS			1	.58**	.03	.02	.09	-.05	-.14	.52***
MSFC				1	.09	.00	.13	.23	-.09	.46**
Hassles					1	.66**	.47**	.16	.44**	.20
Hass-Upl						1	.43**	.48*	.29*	.25
ASQ_Total							1	.35	.73**	.16
ASQ_MS								1	-.20	.17
ASQ_non MS									1	-.02
MSAI										1

*: p<.05; **: p<.01; ***: p<.001

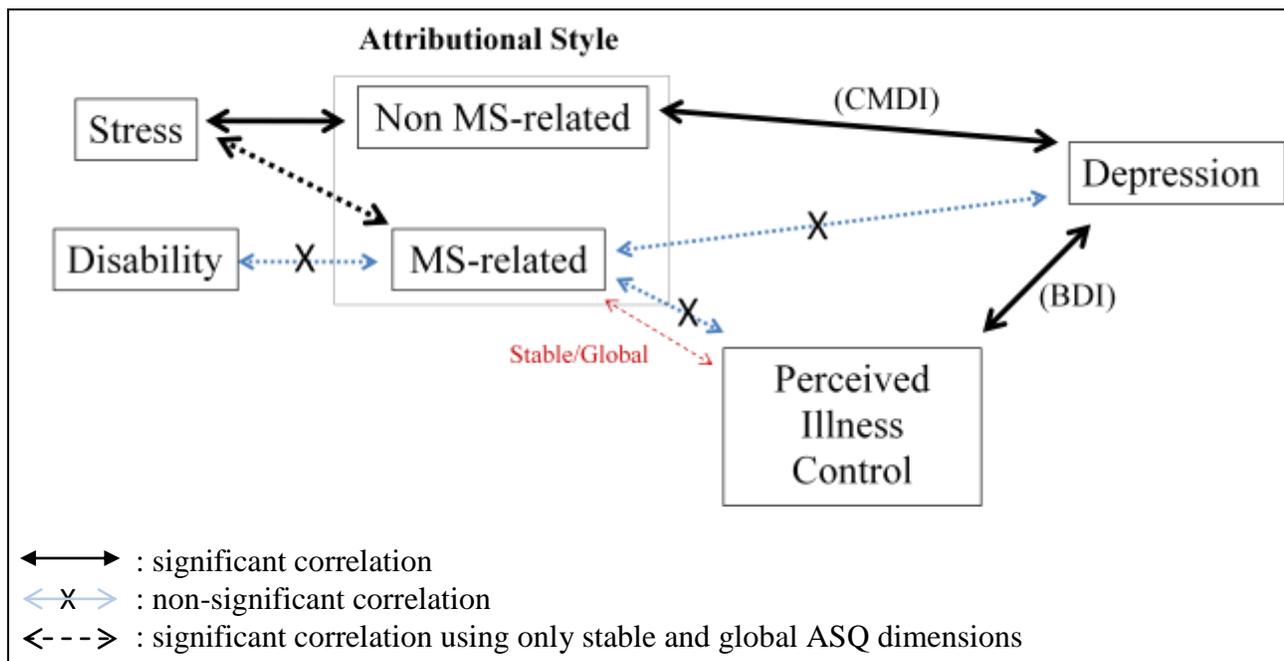
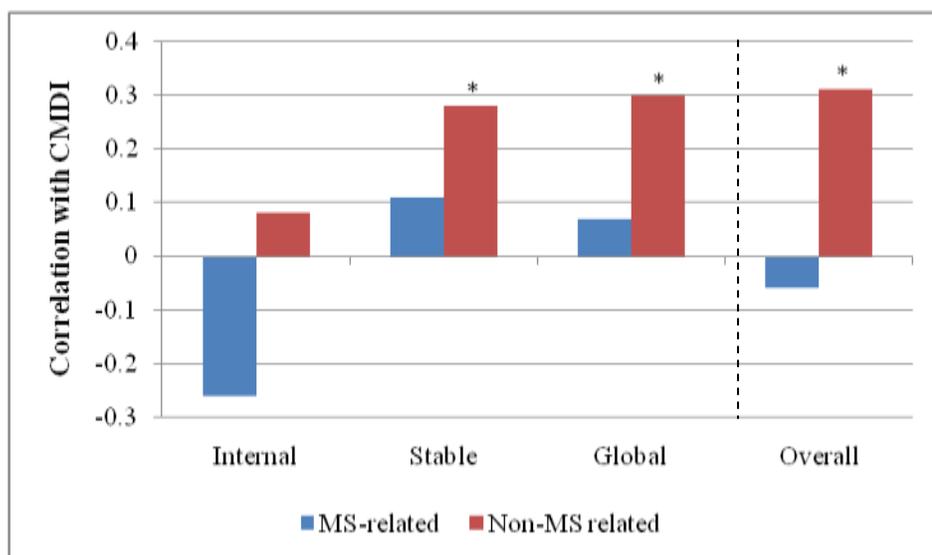


Figure 4. Significant correlations, patients- attributional style divided.

Attributional style was then divided into each dimension and analyzed. No dimensions were significantly related to depression, although global ASQ scores were marginally related (CMDI, .266, $p < .10$). No dimensions correlated with the BDI-FS. When analyzing MS and non-MS-related attributions, stable and global non-MS related attributions correlated significantly with depression (CMDI) (see Figure 5). Although the internal MS-related dimension was not significantly correlated with depression it was the only dimension to be negatively correlated. Internal MS and non-MS-related attributions were marginally different (Fisher's r to Z , one-tail, $p < .10$). Overall MS and non-MS-related attributions were also marginally different (Fisher's r to Z , one-tail, $p < .10$). Stable and global MS and non-MS-related attributions did not differ. Overall, MS-related causes were rated as being significantly more internal, stable and global than non-MS-related causes (ind. samples t -test, $p < .0001$) (see Appendix I for the distributions of MS and non-MS-related internal attributions).



*: significant correlation ($p < .05$)

Figure 5. ASQ dimensional scores for MS and Non-MS related events-
Correlations with Depression

Since separating attributional style into MS and non-MS-related events led to a large decrease in usable data for MS-related attributions, correlational analyses were also done with patients using overall attributional style. Overall attributional style was correlated with both stress scores but not with depression (see Figure 6). However, when the internal dimension was removed, attributional style did correlate with the CMDI (.30, $p < .05$). Additionally, both stress measures correlated significantly with both depression measures. Neither disability measure correlated significantly with overall attributional style (see Figure 7), but both disability measures correlated with the BDI-FS. When the internal dimension was removed, attributional style still did not correlate with disability.

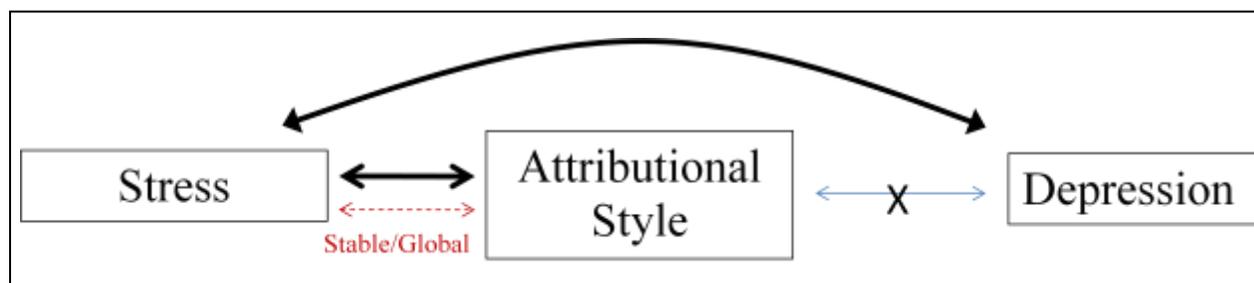


Figure 6. Correlations with overall attributional style and stress, patients

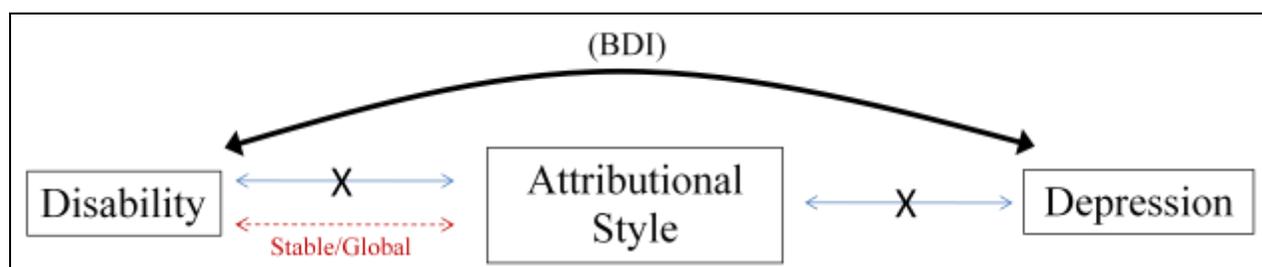


Figure 7. Correlations with overall attributional style and disability, patients

In order to better capture the constructs of depression and disability, composite scores were made by transforming both disability scores and both depression scores into z scores and averaging them. The overall disability measure did not correlate with any ASQ or stress scores. However, it did correlate with the BDI-FS and the MSAI. The overall depression measure was significantly correlated with the total non-MS-related ASQ score, the MSAI, the MSFC, and both stress scores. The composite depression score correlated marginally with global ASQ scores, Total ASQ scores, and global nonMS-related scores. A composite stress score was also created (MSFC and Hassles scores combined) to see how overall stress related to attributional style. This measure was correlated with the composite depression score and each depression score, stable global, and total ASQ scores, the MSAI, stable and global MS-related ASQ scores, and global and total non-MS-related ASQ.

Mediation/Moderation Models

All scores were converted to z scores for regression analyses in order to more easily interpret the relative contributions of each variable. For controls, since the correlations in the proposed pathway to depression were not all significant using overall ASQ scores, mediation was not tested with overall ASQ scores. However, since stress was correlated with both stable and global ASQ ratings and depression, a mediation model was tested to see if stress mediated the effect of stable and global attributions on depression. This model was tested using an SPSS macro published by Preacher and Hayes (2004) and the Sobel statistic suggested a trend towards significance ($Z = 1.83$; $p < .10$, $N=49$) (see Appendix J). Moderation models were also tested to see if stress interacted with attributional style (with or without internal attributions) to predict depression for controls, and these were not significant.

For patients, a mediation model was tested for the non-illness-related pathway since all correlations were significant. Using an SPSS macro published by Preacher and Hayes (2008), a model was tested to see whether non-MS-related attributional style mediated the effect of stress on depression, controlling for disability and diagnosis duration. Although this model was not significant, it was found that stress mediated the effect of non-MS-related and overall attributional style on depression (non-MS: $R^2=.28$, $F(4,46)=4.5$, $p<.01$; overall: $R^2=.22$, $F(4,47)=43.3$, $p<.05$, $N=52$) (see Appendix J). This indicates that more depressogenic attributions (for all causes and for non-MS-related causes specifically) lead to more reported hassles, which in turn lead to higher depression. These same mediation models were then tested using a composite measure for depression (CMDI and BDI-FS). The mediation was still significant, and explained more variance in depression (non-MS/overall: $R^2=.47$, $F(4,46/47)=10.2$, $p<.0001$). The mediation models with non-MS-related attributions represented complete mediation, since the effect of non-MS-related attributions on depression was insignificant after controlling for the effect of the mediator, stress. Overall attributional style did not affect depression whether or not stress was controlled for.

Using the same SPSS Macro, a bootstrapping method with 5,000 resamplings was also used to generate confidence intervals for the indirect effects. For all models except that including overall attributional style and the CMDI, the indirect effect of attributional style on depression via stress was judged to be different from zero at the $\alpha=.05$ level. Thus, the bootstrap estimates supported that the mediation effect for hassles was significant. A moderation model was also tested to see whether stress and overall or non-MS-related attributional style interacted to predict depression, but this model was not significant.

The illness-related pathway (both mediation and moderated mediation) was not tested

since the correlations with MS-related attributions were not significant. A moderation model was tested to see if disability interacted with MS-related attributional style to predict depression and this was not significant. Additionally, for the non-illness-related pathway, since the stable and global overall attributional style score correlated with depression, a mediation model was tested with stable and global overall attributional style mediating the effect of stress on depression, but this was not significant. A model was also tested with stable and global overall attributional style mediating the effect of overall stress (Hassles and MSFC) on depression, but this was also not significant. Also, since MS-related helplessness correlated with disability and depression, a model was tested to see if MS-related helplessness mediated the relationship between disability and depression, and this was not significant.

To test the specific vulnerability hypothesis, pathways were crossed and hassles were analyzed with illness-related ASQ scores and the MSFC was analyzed with non-MS-related ASQ scores. These models were not expected to be significant since they are not within the same domain—and they were not (with either variable as a mediator). Also, a mediation model was tested that did not separate the illness and non-illness related domains by combining hassles and the MSFC, and analyzing this score along with the ASQ as a whole. This was not significant, nor was the same model with moderation. Confirmatory factor analyses were not completed analyzing the MSAI and the illness-related ASQ since these two variables were not correlated.

Chapter 4.

DISCUSSION

Summary of Findings

This study aimed to examine whether the learned helplessness model was applicable in a chronically ill population. Using a cross-sectional design, attributional style in the illness and non-illness domain were analyzed along with illness-related and non-illness related stress to determine whether either (or both) pathway led to increased depression in MS. Based on the learned helplessness model and the specific vulnerability theory developed by Abramson and colleagues (1978; 1989) it was expected that attributional style would act as a mediator between negative events (disability or stress) and depression, but only when the attributional style and events were in the same domain (illness or non-illness). Based on past findings in chronically ill populations, it was also expected that MS-related helplessness would moderate the effect of MS-related attributional style on depression, so that depressogenic attributional style about MS-related causes would only lead to depression if the patient also felt helpless about their illness. In other words, it was expected that a person who experiences many daily hassles who attributes these to internal, stable and global factors will become more depressed. Likewise, if a person is highly disabled and attributes their disease or its symptoms to internal, stable and global factors they will also become more depressed—if they also feel helpless about their illness.

The first hypothesis was that overall attributional style would mediate the effect of stress on depression in controls. This was not supported. Attributional style neither mediated nor moderated the effect of stress on depression, regardless of whether the internal dimension was included. Attributional style correlated with stress when the internal dimension was removed, but attributional style with or without the internal dimension was not related to depression in

controls.

The next hypothesis was that overall attributional style would mediate the effect of stress on depression in patients. This was also not supported. Overall attributional style neither mediated nor moderated the effect of negative events (stress, disability or a composite of both) on depression. Overall attributional style correlated with stress but did not correlate with disability or depression. However, when the internal dimension was removed attributional style did correlate with depression.

Furthermore, it was hypothesized that the specific vulnerability model would apply to patients such that MS-related attributional style would mediate the effect of disability on depression and non-MS-related attributional style would mediate the effect of stress on depression. This model was not supported for either domain. Neither MS nor non-MS-related attributional style mediated or moderated the effect of stress or disability on depression. Conversely, it was found that stress mediated the effect of non-MS-related attributional style on depression, after controlling for diagnosis duration and disability. (Moderation was not significant.) Therefore, depressogenic attributions about non-disease-related causes of negative events were associated with greater subjective daily stress, which in turn were associated with greater depression.

Following the specific vulnerability theory, it was expected that stress would not affect MS-related attributional style and disability would not affect non-MS-related attributional style. While MS-related attributional style did correlate with stress (the only variable with which it correlated), no mediation or moderation was tested since the pathways did not have significant correlations. Finally, it was hypothesized that MS-related helplessness would moderate the relationship between MS-related attributional style and depression. It was also expected that

MS-related helplessness and MS-related attributional style would represent similar constructs. MS-related helplessness did not correlate with MS-related attributional style and neither hypothesis was supported.

Detailed descriptive analyses were done on the ASQ causes and separate dimensions. While overall the majority of cases listed were not MS-related, patients listed the most MS-related causes for work-related events. More disabled patients and patients who felt more helpless towards their illness listed more MS-related causes. MS-related causes were also rated as more internal, stable, and global than non-MS-related causes. Global ASQ ratings were marginally correlated with depression. Stable and global non-MS-related ratings correlated with depression. The internal MS-related ratings were the only dimension negatively correlated with depression but this correlation was not significant. This correlation was marginally different from the internal non-MS ratings, as were the overall MS and non-MS-related ratings.

Overall, attributional style did appear to be related to stress in patients, and in controls when the internal dimension was removed. Stable and global attributional style was also correlated with depression in patients. Dividing the ASQ into MS and non-MS-related causes led to many interesting observations. First of all, the internal dimension was negatively correlated with depression when MS-related and positively when non-MS-related. This negative correlation between internal MS-related attributions appears to have decreased the overall positive correlation between the ASQ and depression. Additionally, this analysis of the ASQ showed that the majority of causes listed were non-MS-related and that the events most attributed to MS-related causes were work-related. Patients with greater levels of disability and disease-related helplessness reported more MS-related causes on the ASQ. Furthermore, MS-related causes were rated as more internal, stable, and global than non-MS-related causes.

Finally, it was found that stress mediated the effect of overall and non-MS-related attributional style on depression.

Comparison with Past Findings

Some of these findings replicate past studies on attributional style in MS. For instance, Barrett et al. (1992) and Kneebone and Dunmore (2004) also found that internal attributional style did not correlate with depression while global ratings did correlate (here it was marginally correlated). While in Barrett's study both MS and non-MS-related global attributions correlated with depression, in the current study only non-MS-related global attributions correlated with depression. This could have been due to the decreased power for MS-related attributions. Also, in Barrett's study participants were listing causes for MS-related *events* and rating those causes, while in this study participants were listing causes for generic events and rating these *causes* that were deemed MS-related. (Thus in Barrett's study participants' ratings themselves might not be in relation to their MS even though the event is.) These results also suggest that attributions may act differently depending on the domain. This study also replicated Barrett's findings in that overall stable ratings did not correlate with depression. However, in Barrett's study, neither MS-related stable attributions nor non-MS-related stable attributions correlated with depression, but in this study non-MS-related stable attributions *did* correlate with depression. This again might be due to differences in the measures used.

This study also replicates Barrett's finding that general or MS-related stress do not interact to predict increased hopelessness (although the current study was cross-sectional and was predicting depression instead of hopelessness). However, Kneebone and Dunmore *did* find that general and MS-related stress (recent life events and time since last exacerbation) interacted with stable and global attributional style to predict depression cross-sectionally. In the current

study, when only stable and global attributions were analyzed, they still did not interact with stress to predict depression. It is possible that the large number of subjects (495) and the different life event and exacerbation-based measures used accounted for the difference in results.

Additionally, the present study also replicates Johnson and colleagues' (2001) findings that patients have more stable attributions than controls. However, in this study patients also had more internal and global attributions than controls. Although the same ASQ measure was used in Johnson's study, it is possible that low numbers of subjects in their study (N=16) played a role in their lack of significant findings. Furthermore, while this was not an explicit hypothesis, the current study does not support past findings that MS-related helplessness predicts depression after controlling for disease factors (Jopson & Moss-Morris, 2003; Shnek et al., 1997). It also does not support van der Werf's findings that MS-related helplessness mediated the relationship between disability and depression (also not a hypothesis in the current study). While the current study found that MS-related helplessness was related to both depression and disability, it did not show a mediational relationship. It is possible that the more limited definition of depression in the current study or the different disability measure affected the results.

Interpretations of Results

The learned helplessness model states that while negative uncontrollable events are necessary to generate the cognitive vulnerability for depression (a depressogenic attributional style), further negative events are necessary to trigger depression once the attributional style is already in place. Therefore, the direction of the mediation found in this study still fits with this model. However, since we used a measure of perceived stress it is impossible to determine whether the effect is due to more perceived stress or more objective stressful events in these participants' lives. It is possible that patients with a depressogenic attributional style are more

likely to perceive or remember their daily events as stressful (regardless of whether the actual amount of negative events increases). Past studies have found that depression predicts increased stress, and it is possible that depressive symptoms lead to a more hopeless perspective which leads to a greater perception of stress (Liu & Alloy, 2010). Simons and colleagues (1993) found that depressed individuals with a more negative cognitive style retrospectively reported more negative life events. In other words, these patients see aspects of their daily life as more stressful because they do not think they can change them. Furthermore, depressed patients are known to have negative memory biases (Gilboa & Gotlib, 1997; Timbremont & Braet, 2004), something that has also been found in MS studies (Bruce & Arnett, 2005). Therefore, it is possible that patients with a depressogenic attributional style are more likely to have this memory or perceptual bias, and this in turn leads to increased depression.

Alternatively, these results might also imply that this type of attributional style leads to an increase in the actual amount of daily stressors. The stress generation effect (Hammen, 1991) refers to the much replicated finding that depressed individuals or individuals with a recent remission of depression often experience more negative events that are interpersonal in nature and/or dependent on their behavior. Studies have shown that a negative cognitive or inferential style (similar to attributional style) can lead to hopelessness which can then lead to an increase in negative events and stress that is dependent on their behavior (Joiner et al., 2005a; 2005b; Kercher & Rapee, 2009). It does not predict stress that is independent of their behavior (e.g. a sickness in the family). In fact, similar to the current findings, interpersonal stress has been found to mediate the relationship between hopelessness and a later increase in depressive symptoms (Joiner et al., 2005b). Safford and colleagues (2007) found that non-depressed undergraduates with negative cognitive style (including internal, stable, and global attributions as

well as negative inferences about the consequences and self-implications of the events) reported more negative life events over the next six months than those with positive cognitive styles. The negative life events were interpersonal or dependent on their behavior, and the measure used included major and minor events that were both episodic and chronic). Participants in this study had no current or past depression. Therefore, there is a precedent for finding stress to be a mediator between depressogenic cognitive style and depression, although the actual mechanism is unclear.

Because of the subjectivity of the stress measure used, it is unclear whether the same results would have been found with a more objective measure of discrete negative events. Structured or semi-structured interviews would provide a chance to measure stress and negative events in a more reliable way. In fact, participants have been shown to report more events and higher severity ratings on a self-report measure of stress than an interview-based assessment (Simons et al., 1993).

While there was a mediation effect found in the non-illness-related pathway, this study did not find a significant mediational or moderational effect for the illness-related pathway. In this study, disability was related to depression but not to overall or MS-related attributional style—meaning that more disabled patients were not more likely to have a depressogenic attributional style about their MS or overall. It seems that the assumption that disability was comparable to illness-related stress was not true. While more disabled patients were more depressed, their disability was not related to attributional style like stress was. It is quite possible that the same level of disability could be seen as extremely distressing or hardly distressing, depending on the patient's personality factors. Therefore, it is not clear how disability should fit into the learned helplessness model. However, it is interesting that in this study an interaction

was not found between disability and attributional style—so that even if a patient was highly disabled and attributing their disability (or everything) to maladaptive factors, they were no more likely to be depressed. While the model proposed by Arnett and colleagues suggests that conceptions of self and illness might moderate the effect of disease factors on depression, this study found that this particular measure of patients' conceptions of their illness did not moderate the effect of disability on depression. It is possible that a measure of how stressful a patient's MS and symptoms are would be more comparable to perceived hassles and would be more appropriate for this model. If a measure like this was used, a mediational effect might have also been found for the disease-related pathway.

While disability might have been too different conceptually from negative events or stress, there was also a lack of findings with MS-related attributional style. While the current study did not disprove the specific vulnerability theory—since MS and non-MS-related attributional style did not mediate the effect of stress from the other domain on depression—there was a lack of correlation in the illness-related pathway and MS-related attributions correlated with stress. The specific vulnerability theory only had partial support in the literature before this study, and it had never been applied to the MS population. It is possible that in a chronically ill population, a clear separation cannot be made between illness-related and non-illness-related factors. For instance, there is no reason that all of the hassles items (and their responses) could be affected by a patient's MS. While it might be possible to use a different measure or give more explicit instructions about not considering the effects of their MS, this most likely would not eliminate all overlap. Additionally, the current study did not use an attributional style measure specifically designed to test both domains. Our measure was divided post hoc, which required a somewhat subjective judgment and resulted in decreased power,

especially for MS-related attributions. While more explicit and differentiated measures could be used for both stressors and attributional style, it is possible that the theory itself is flawed or very hard to test, at least when using self-report measures in a chronically ill population.

This study supports past findings that internal attributions seem to represent a somewhat different construct than stable and global attributions. In fact, this observation is what led researchers to propose the hopelessness model of depression (Abramson, Metalsky & Alloy, 1989) which removes the internal dimension all together. While the correlations were not significant, internal MS-related attributions were negatively related to depression and disease-related helplessness while internal non-MS-related attributions were positively related to both. This suggests that in these patients attributing their MS and its symptoms to themselves, or “personal factors,” is more adaptive than thinking of them as a separate “circumstance” that is acting upon them. This does not fit with the idea that internal attributions about any negative event are maladaptive. Therefore, past null findings with the internal dimension might be due to the fact that internal attributions can be adaptive *if* they are in reference to certain things like their illness or symptoms. While they are slightly different constructs, this supports past studies that have shown that perceived illness control can be adaptive in certain situations (Affleck et al., 1987; Schiaffino & Revenson, 1992). The fact that overall attributional style did not correlate with depression in the current study might be due to the internal dimension—once the internal dimension was removed, attributional style did correlate with depression. Consequently, these results suggest that the internal dimension should not be disregarded completely in chronically ill populations, just analyzed more carefully.

Another example of how internal attributions can be adaptive can be seen through their relationship with MS-related helplessness. Stable and global MS-related attributions were

correlated positively with MS-related helplessness while internal MS-related attributions were negatively correlated (although not significantly). This suggests that the more patients thought MS-related causes were due to stable and global causes the more helpless they felt; while the more they thought MS-related causes were due to internal or personal factors, the *less* helpless they felt.

This study was only the second known to look at MS-related and non-MS-related attributional style, and the first to actually divide causes on the ASQ into MS-related and non-MS-related categories. It was also the first known study to describe in detail the types of causes MS patients listed on the ASQ. It was found that the majority of causes listed by patients were not MS-related. This shows that, at least for hypothetical events, most patients do not see their MS as affecting every area of their life. It seems they are able to maintain multiple different self-aspects, something that has been shown to be adaptive in healthy populations (Linville, 1987). Patients clearly believe that non-MS factors are more important contributors to negative things that may happen; in turn, these non-MS causes contribute more to their depression. Additionally, the more disabled patients were more likely to attribute events to their MS, although it did not affect their *style* of attribution. This shows that increased disability leads patients to attribute more things to their MS, perhaps making it more difficult to compartmentalize. However, more disabled patients are not more likely to see their MS or its symptoms as internal, stable, and global.

Descriptive analyses of the ASQ also showed that patients were most likely to attribute work-related negative events to MS-related causes (getting their work done and finding a job). It is possible that work is most affected by the patients' MS symptoms like cognitive deficits, fatigue, and physical limitations—for example, five patients listed fatigue as a reason they could

not get all the work done that other expected of them. The other events in the ASQ are more interpersonal in nature (e.g. a date goes badly, a friend acts hostilely) and these might be less directly affected by MS. However, since these are hypothetical events it is not possible to say whether work is actually more affected by MS symptoms than other domains. Past studies on attributional style and specific vulnerability have looked at the affiliative vs. achievement domains—these results suggest that this division might be helpful in this population as well.

Results from the current study also indicate that the CMDI and BDI-FS are surprisingly different constructs, correlating modestly with each other ($r=.37$) and differentially relating to attributional style, disability, and MS-related helplessness. Specifically, the CMDI was significantly correlated with non-MS-related attributional style while the BDI-FS was correlated with disability and disease-related helplessness. The BDI-FS also seemed to differentiate patients from controls more than the CMDI. Since neither depression measure includes vegetative items it is unclear why the BDI-FS is more related to disease-related measures. The BDI-FS items that are not included in the CMDI are pessimism, loss of pleasure, and suicidal thoughts and wishes. The CMDI also includes items relating to others' views of the individual (e.g. rejected, resented). It is possible that the BDI-FS items are more pathological or rare and thus only present significantly in moderate or severely depressed participants- which were only patients. The CMDI, on the otherhand, might be more normative and related to non-illness processes.

Clinical Implications

Since attributional style seems to start one pathway to depression in MS patients, it might represent a malleable target for cognitive therapy. Past studies have shown that attributional style can be changed through therapy (DeRubeis & Hollon, 1995; Peterson et al., 1982; Seligman

et al., 1988). If this cognitive style can be changed, MS patients might experience fewer stressors or perceive their daily life as less stressful, and in turn be less depressed. This study also suggests that clinicians working with MS patients should not assume that they will attribute all negative events to their MS, as in this study the majority of attributions were non-MS-related. Clinicians assuming this might use a misguided treatment approach. Instead, patients' lives should be viewed as more complex. Additionally, steps can be taken to encourage more disabled patients to not view all areas of their life as affected by their MS, since this might be associated with more helplessness. Additionally, this study suggests that counseling specifically focused on employment issues might be especially helpful for MS patients. Finally, these results show that thinking of one's MS and its symptoms as due to an outside factor acting upon them can lead to depression and helplessness, as opposed to good outcomes. Patients should therefore not shy away from taking some ownership in their MS.

Limitations

The current study has several limitations. First, the attributional style measure used was not meant to address MS and non-MS-related causes specifically since a standardized measure of this sort could not be found. However, the open-endedness of the measure allowed an opportunity to measure these patients' attributions without assuming what they would be related to. Furthermore, by dividing the causes into two categories, this meant that sometimes patients' ASQ scores were based on very few ratings—and almost half had no MS-related ASQ scores at all. While a measure similar to that Barrett created could be useful, it is more difficult to standardize a measure when the domain depends on the participants' responses.

Furthermore, perhaps because of the nature of the ASQ Likert scales, many 4 ratings were given which reduced the variability of the data. Additionally, patients who were missing

more than half of the measure and were excluded from analyses differed from included subjects on sex (were more male), MSFC (more disabled), the BDI-FS (were more depressed), and relative hassles (had relatively more uplifts). Therefore, the current findings might be more applicable to a less disabled and less depressed female MS population. The Cognitive Style Questionnaire (Alloy et al., 2000) is an updated version of the ASQ that is thought to be more psychometrically sound and might be better suited for future studies of this sort.

Additionally, as mentioned before, the chronicity of the stress measured in this study might have been too dissimilar from the discrete negative events usually included in learned helplessness models. Also, like many similar studies, all measures in the current study, besides disability measures, were self-report. This can lead to artificial or inflated correlations; however this does not appear to be a problem in this study. Furthermore, controls in this study were younger and more educated than the patients, which might have influenced the difference noted between ASQ scores of patients and controls.

Summary and Recommendations

Attributional style does appear to be an important construct to consider when examining depression in MS patients. However, attributional style does not appear to lead directly to depression but instead to more perceived stress which in turn leads to increased depression. This study also found that patients do not attribute most negative things that might happen to them to their MS. They see their MS as affecting more achievement-related events than affiliative ones. Additionally, attributions appear to operate differently when they are illness or non-illness-related. For instance, internal attributions appear to be adaptive when in reference to MS-related events, while stable and global attributions are associated with depression in both domains. Disability also appears to operate differently from daily stress, and neither one leads to

depressogenic attributional styles in these patients—thus neither seem to operate like uncontrollable negative events were thought to in the original learned helplessness model.

Future studies should continue to study this topic using more specialized illness and non-illness related attributional style measures, as well as interview-based measures of negative life events and stress. Treatment studies might also be done that are focused on modifying attributional style and perceptions of stress. While clinicians cannot directly change the day-to-day stress in MS patients' lives, through attributional style they might be able to alter patients' perceptions of stress and thus decrease the likelihood that patients will become depressed.

REFERENCES

- Abela, J.R., Brozina, K., & Seligman, M.E. (2004). A test of integration of the activation hypothesis and the diathesis-stress component of the hopelessness theory of depression. *British Journal of Clinical Psychology*, 43(Pt 2): 111-128.
- Abela, J.R., & D'Alessandro, D.U. (2002). Beck's cognitive theory of depression: a test of the diathesis-stress and causal mediation components. *British Journal of Clinical Psychology*, 41(Pt 2): 111-128.
- Abela, J.R.Z., & Seligman, M.E.P. (2000). The hopelessness theory of depression: A test of the diathesis-stress component in the interpersonal and achievement domains. *Cognitive Therapy and Research*, 24: 361-378.
- Abramson, L.Y., Metalsky, G.I., & Alloy, L.B. (1989). Hopelessness depression: A theory based sub-type of depression. *Psychological Review*, 96: 358-372.
- Abramson, L.Y., Seligman, M.E. & Teasdale, J.D. (1978) Learned helplessness in humans: Critique and reformulation. *Journal of Abnormal Psychology*, 87(1): 49-74.
- Affleck, G., Tennen, H., Pfeiffer, C., & Fifield, J. (1987). Appraisals of control and predictability in adapting to a chronic disease. *Journal of Personality and Social Psychology*, 53(2): 273-279.
- Alloy, L.B., Abramson, L.Y., Hogan, M.F., Whitehouse, W.G., Rose, D.T., Robinson, M.S., et al. (2000). The Temple-Wisconsin Cognitive Vulnerability to Depression Project: Lifetime history of Axis I psychopathology in individuals at high and low cognitive risk for depression. *Journal of Abnormal Psychology*, 109:403-418.
- Alloy, L.B., Abramson, L.Y., Whitehouse, W.G., Hogan, M.E., Tashman, N.A., Steinberg, D.L., Rose, D.T. & Donovan, P. (1999). Depressogenic cognitive styles: Predictive validity,

- information processing and personality characteristics, and developmental origins. *Behavior Research and Therapy*, 37: 503-531.
- Alloy, L.B. & Clements, C.M. (1998) Hopelessness Theory of Depression: Tests of the Symptom Component. *Cognitive Therapy and Research*, 22(4): 303-335.
- Alloy, L.B., Just, N. & Panzarella, C. (1997) Attributional Style, Daily Life Events, and Hopelessness Depression: Subtype Validation by Prospective Variability and Specificity of Symptoms. *Cognitive Therapy and Research*, 21(3): 321-344.
- Arnett, P.A., Barwick, F.H., & Beeney, J.E. (2008). Depression in multiple sclerosis: review and theoretical proposal. *Journal of the International Neuropsychological Society*, 14(5): 691-724.
- Arnett, P.A., Higginson, C.I., Voss, W.D., Bender, W.I., Wurst, J.M., & Tippin, J. (1999a). Depression in multiple sclerosis: Relationship to working memory capacity. *Neuropsychology*, 13: 546-556.
- Arnett, P.A., Higginson, C.I., Voss, W.D., Wright, B., Bender, W.I., Wurst, J.M., & Tippin, J.M. (1999b). Depressed mood in multiple sclerosis: Relationship to capacity-demanding memory and attentional functioning. *Neuropsychology*, 13: 434 - 446.
- Barrett, L. (1992). The hopelessness theory of depression: A test of the diathesis-stress component in a multiple sclerosis sample. *Dissertation Abstracts International*, 53: 2535B.
- Barnett, P.A., & Gotlib, I.H. (1988). Psychosocial functioning and depression: distinguishing among antecedents, concomitants, and consequences. *Psychological Bulletin*, 104(1): 97-126.
- Beck, A.T. (1967). *Depression: Clinical, experimental, and theoretical aspects*. New York:

Hoerber.

- Beeney, J. & Arnett, P.A.A. (2008). Stress and Memory Bias Interact to Predict Depression in Multiple Sclerosis. *Neuropsychology*, 22(1): 118-126.
- Benedict, R., Fishman, I., McClellan, M., Bakshi, R., & Weinstock-Guttman. (2003). Validity of the Beck Depression Inventory-Fast Screen in Multiple Sclerosis. *Multiple Sclerosis*, 9: 393-396.
- Brown, J.D., & Siegel, J.M. (1988). Attributions for negative life events and depression: the role of perceived control. *Journal of Personality and Social Psychology*, 54(2): 316-322.
- Bruce, J.M. & Arnett, P.A. (2005). MS patients with depressive symptoms exhibit affective memory biases when verbal encoding strategies are suppressed. *Journal of the International Neuropsychological Society*, 11(5): 514-521.
- Chaney, J.M., Mullins, L.L., Vretsky, D.L., Doppler, M.J., Palmer, W.R., Wees, S.J., et al. (1996). Attributional style and depression in rheumatoid arthritis: The moderating role of perceived illness control. *Rehabilitation Psychology*, 41: 205-223.
- Chang, C.H., Nyenhuis, D.L., Cella, D., Luchetta, T., Dineen, K., & Reder, A.T. (2003). Psychometric evaluation of the Chicago Multiscale Depression Inventory in multiple sclerosis patients. *Multiple Sclerosis*, 9(2): 160-170.
- Christensen, A. J., Turner, C. W., Smith, T. W., Holman, J. M., & Gregory, M. C. (1991). Health locus of control and depression in end-stage renal disease. *Journal of Consulting and Clinical Psychology*. 59: 419–424.
- DeRubeis, R.J. & Hollon, S.D. (1995). Explanatory style in the treatment of depression. In Buchanan, G.M. & Seligman, M.E.P. (Eds.), *Explanatory style* (pp. 99-111). Hillsdale, NJ: Erlbaum.

- Dikmen, S. S., Machamer, J. E., Winn, H. R., & Temkin, N. R. (1995). Neuropsychological outcome at 1-year post head injury. *Neuropsychology*, 9: 80-90.
- Dixon, J.F. & Ahrens, A.H. (1992) Stress and attributional style as predictors of self-reported depression in children. *Cognitive Therapy and Research*, 16(6): 623-634.
- Ehde, D.M., Kraft, G.H., Chwastiak, L., Sullivan, M.D., Gibbons, L.E., Bombardier, C.H. & Wadhvani, R. (2008). Efficacy of paroxetine in treating major depressive disorder in persons with multiple sclerosis. *General Hospital Psychiatry*, 30(1):40-48.
- Feinstein, A., Roy, P., Lobaugh, N., Feinstein, K., O'Connor, P. & Black, S. (2004) Structural brain abnormalities in multiple sclerosis patients with major depression. *Neurology*, 62: 586-590.
- Fischer, J.S., Jak, A.J, Kniker, J.E., Rudick, R.A., & Cutter, G. (2001) Multiple Sclerosis Functional Composite (MSFC): administration and scoring manual. *National Multiple Sclerosis Society*.
- Fischer, J.S., Rudick, R.A., Cutter, G.R., & Reingold, S.C. (1999). The Multiple Sclerosis Functional Composite Measure (MSFC): an integrated approach to MS clinical outcome assessment. *Multiple Sclerosis*, 5: 244-250.
- Fresco, D.M., Alloy, L.B. & Reilly-Harrington, N. (2006). Association of Attributional Style for Negative Events and Positive Events and the Occurrence of Life Events with Depression and Anxiety. *Journal of Social and Clinical Psychology*, 25(10): 1140-1159.
- Gilboa, E., & Gotlib, I.H. (1997). Cognitive biases and affect persistence in previously dysphoric and never-dysphoric individuals. *Cognition and Emotion*, 11: 517 – 538.
- Goodkin, D. E. (1992). The natural history of multiple sclerosis. In R. A. Rudick & D. E. Goodkin (Eds.), *Treatment of multiple sclerosis: Trial design, results and future*

- perspectives (pp. 17-46). New York: Springer-Verlag.
- Grima, D.T., Torrance, G.W., Francis, G., Rice, G., Rosner, A.J., & Lafortune, L. (2000). Cost and health related quality of life consequences of multiple sclerosis. *Multiple Sclerosis*, 6(2): 91-98.
- Hammen, C. (1991). Generation of stress in the course of unipolar depression. *Journal of Abnormal Psychology*, 100:555–561.
- Hickey, A. & Greene, S.M. (1989). Coping with multiple sclerosis. *Irish Journal of Psychological Medicine*, 6:118-124.
- Joffe, R.T., Lippert, G.P., Gray, T.A., Sawa, G., & Horvath, Z. (1987). Mood disorder and multiple sclerosis. *Archives of Neurology*, 44: 376-378.
- Johnson, S.K., Lange, G., Tiersky, L., Deluca, J., & Natelson, B.H. (2001). Health-Related Personality Variables in Chronic Fatigue Syndrome and Multiple Sclerosis. *Journal of Chronic Fatigue Syndrome*, 8(3,4):41-52.
- Joiner, T.E., Wingate, L.R., Gencoz, T., Gencoz, F. (2005a) Stress generation in depression: Three studies on its resilience, possible mechanism, and symptom specificity. *Journal of Social and Clinical Psychology*, 24:236–253.
- Joiner, T.E., Wingate, L.R., Otamendi, A. (2005b). An interpersonal addendum to the hopelessness theory of depression: Hopelessness as a stress and depression generator. *Journal of Social and Clinical Psychology*, 24:649–664.
- Jopson, N.M., & Moss-Morris, R. (2003). The role of illness severity and illness representations in adjusting to multiple sclerosis. *Journal of Psychosomatic Research*, 54(6): 503-511; discussion 513-504.
- Kercher, A. & Rapee, R.M. (2009). A test of a cognitive diathesis-stress generation pathway in

- early adolescent depression. *Journal of Abnormal Child Psychology*, 37:845-855.
- Kanner, A.D., Coyne, J.C., Schaefer, C. & Lazarus, R.S. (1981). Comparison of Two Modes of Stress Measurement: Daily Hassles and Uplifts versus Major Life Events. *Journal of Behavioral Medicine*, 4(1): 1-39.
- Kneebone, I.I., & Dunmore, E. (2004). Attributional style and symptoms of depression in persons with multiple sclerosis. *International Journal of Behavioral Medicine*, 11(2): 110-115.
- Kneebone, I.I., Dunmore, E.C., & Evans, E. (2003). Symptoms of depression in older adults with multiple sclerosis (MS): comparison with a matched sample of younger adults. *Aging & Mental Health*, 7(3): 182-185.
- Lasar, M., & Kotterba, S. (1993). Locus of control of patients with a phasic encephalomyelitis disseminata course. *Schweizer Archiv fur Neurologie und Psychiatrie*, 144(2): 147-162.
- Lasar, M., & Kotterba, S. (1997). Coping style and cognitive attitude in patients with multiple sclerosis. *Wien Klin Wochenschr*, 109(24): 954-959.
- Lau, J.Y.F. & Eley, T.C. (2008). Attributional style as a risk marker of genetic effects for adolescent depressive symptoms. *Journal of Abnormal Psychology*, 117(4): 849-859.
- Linville, P.W. (1987). Self-complexity as a cognitive buffer against stress-related illness and depression. *Journal of Personality and Social Psychology*, 52(4): 663-676.
- Liu, R.T. & Alloy, L.B. (2010). Stress generation in depression: A systematic review of the empirical literature and recommendations for future study. *Clinical Psychology Review*, 30:582-593.
- Lublin, F.D., & Reingold, S.C. (1996). Defining the clinical course of multiple sclerosis: Results of an international survey. *Neurology*, 46: 907-911.

- Macleod, L., & Macleod, G. (1998). Control cognitions and psychological disturbance in people with contrasting physically disabling conditions. *Disability & Rehabilitation*, 20(12): 448-456.
- Marks, S.F. & Millard, R.W. (1990). Nursing assessment of positive adjustment for individuals with multiple sclerosis. *Rehabilitation Nursing*, 15(3):147-51.
- McDonald, W., Compston, A., Edan, G., Goodkin, D., Hartung, H., Lublin, F., McFarland, H., Paty, D., Polman, C., Reingold, S., Sandberg-Wollheim, M., Sibley, W., Thompson, A., van den Noort, S., Weinshenker, B. & Wolinsky, J. (2001). Recommended Diagnostic Criteria for Multiple Sclerosis: Guidelines from the International Panel on the Diagnosis of Multiple Sclerosis. *Annals of Neurology*, 50: 121-127.
- McGuinness, S. (1996). Learned helplessness in the multiple sclerosis population. *The Journal of Neuroscience Nursing*, 28(3): 163-170.
- Metalsky, G.I., Halberstadt, L.J., & Abramson, L.Y. (1987). Vulnerability to depressive mood reactions: toward a more powerful test of the diathesis-stress and causal mediation components of the reformulated theory of depression. *Journal of Personality and Social Psychology*, 52(2): 386-393.
- Metalsky, G.I. & Joiner, T.E. (1992). Vulnerability to Depressive Symptomatology: A Prospective Test of the Diathesis-Stress and Causal Mediation Components of the Hopelessness Theory of Depression. *Journal of Personality and Social Psychology*, 63(4): 667-675.
- Metalsky, G.I., Joiner, T.E., Hardin, T.S. & Abramson, L.Y. (1993). Depressive Reactions to Failure in a Naturalistic Setting: A Test of the Hopelessness and Self-Esteem Theories of Depression. *Journal of Abnormal Psychology*, 102(1): 101-109.

- Minden, S.L., Orav, J., & Reich, P. (1987). Depression in multiple sclerosis. *General Hospital Psychiatry*, 9(6): 426-434.
- Mohr, D.C., Boudewyn, A.C., Goodkin, D.E., Bostom, A. & Epstein, L. (2001). Comparative outcomes for individual cognitive-behavior therapy, supportive-expressive group psychotherapy, and sertraline for the treatment of depression in multiple sclerosis. *Journal of Consulting and Clinical Psychology*, 69(6):1-8.
- Mohr, D. C., & Dick, L. P. (1998). Multiple sclerosis. In P.M. Camic & S. Knight (Eds.), *Clinical handbook of health psychology: A practical guide to effective interventions* (pp. 313-348). Seattle: Hogrefe & Huber.
- Nolen-Hoeksema, S., Girgus, J.S. & Seligman, M.E.P. (1992). Predictors and Consequences of Childhood Depressive Symptoms: A 5-Year Longitudinal Study. *Journal of Abnormal Psychology*, 101(3): 405-422.
- Nyenhuis, D.L., Luchetta, T., Yamamoto, C., Terrien, A., Bernardin, L., Rao, S.M., & Garron, D.C. (1998). The development, standardization, and initial validation of the Chicago Multiscale Depression Inventory. *Journal of Personality Assessment*, 70: 386-401.
- Nyenhuis, D.L., Rao, S.M., Ph.D., Zajecka, J., M.D., Luchetta, T., Bernardin, L., & Garron, D. (1995). Mood disturbance versus other symptoms of depression in multiple sclerosis. *Journal of the International Neuropsychological Society*, 1: 291-296.
- Parker, J.C., Smarr, K.L., Buescher, K.L., Phillips, L.R., Frank, R.G., Beck, N.C., Anderson, S.K., & Walker, S.E. (1989). Pain control and rational thinking. Implications for rheumatoid arthritis. *Arthritis & Rheumatism*, 32(8): 984-990.
- Patten, S.B., & Metz, L.M. (1997). Depression in multiple sclerosis. *Psychotherapy and Psychosomatics*, 66: 286-292.

- Peterson, C., Maier, S.F., & Seligman, M.E.P. (1993). *Learned Helplessness: A theory for the age of personal control*. New York: Oxford.
- Peterson, C., Semmel, A., von Baeyer, C., Abramson, L.Y., Metalsky, G.I., & Seligman, M.E.P. (1982). The Attributional Style Questionnaire. *Cognitive Therapy and Research*, 6: 287-299.
- Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling procedures for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, 40, 879-891
- Preacher, K.J., & Hayes, A.F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers*, 36(4): 717-731.
- Preacher, K. J., Rucker, D. D., & Hayes, A. F. (2007). Addressing moderated mediation hypotheses: Theory, methods, and prescriptions. *Multivariate Behavioral Research*, 42: 185-227.
- Riazi, A., Thompson, A.J. & Hobart, J.C. (2004). Self-efficacy predicts self-reported health status in multiple sclerosis. *Multiple Sclerosis*, 10: 61-66.
- Rudick, R., Antel, J., Confavreux, C., Cutter, G., Ellison, G., Fischer, J., Lublin, F., Miller, A., Petkau, J., Rao, S., Reingold, S., Syndulko, K., Thompson, A., Wallenberg, J., Weinshenker, B., & Willoughby, E. (1997). Recommendations from the national multiple sclerosis society clinical outcomes assessment task force. *Annals of Neurology*, 42(3): 379-382.
- Sadovnick, A.D., Remick, R.A., Allen, J., Swartz, E., Yee, I.M., Eisen, K., Farquhar, R., Hashimoto, S.A., Hooge, J., Kastrukoff, L.F., Morrison, W., Nelson, J., Oger, J., & Paty,

- D.W. (1996). Depression and multiple sclerosis. *Neurology*, 46(3): 628-632.
- Safford, S.M., Alloy, L.B., Abramson, L.Y. & Crossfield, A.G. (2007). Negative cognitive style as a predictor of negative life events in depression-prone individuals: A test of the stress generation hypothesis. *Journal of Affective Disorders*, 99(1-3): 147-154.
- Schiaffino, K.M. & Revenson, T.A. (1992). The role of perceived self-efficacy, perceived control, and causal attributions in adaptation to rheumatoid arthritis: Distinguishing mediator from moderator effects. *Personality & Social Psychology Bulletin*, 18: 790.
- Schiaffino, K.M., Revenson, T.A., & Gibofsky, A. (1991). Assessing the impact of self-efficacy beliefs on adaptation to rheumatoid arthritis. *Arthritis Care & Research*, 4(4): 150-157.
- Seligman, M.E., Castellon, C., Cacciola, J., Schulman, P., Luborsky, L., Ollove, M., & Downing, R. (1988). Explanatory style change during cognitive therapy for unipolar depression. *J Abnormal Psychology*, 97(1): 13-18.
- Shnek, Z.M., Foley, F.W., LaRocca, N.G., Gordon, W.A., DeLuca, J., Schwartzman, H.G., Halper, J., Lennox, S., & Irvine, J. (1997). Helplessness, self-efficacy, cognitive distortions, and depression in multiple sclerosis and spinal cord injury. *Annals of Behavioral Medicine*, 19(3): 287-294.
- Shnek, Z.M., Foley, F.W., LaRocca, N.G., Smith, C.R. & Halper, J. (1995). Psychological predictors of depression in multiple sclerosis. *Journal of Neurologic Rehabilitation*, 9(1): 15-23.
- Simons, A.D., Angell, K.L., Monroe, S.M., Thase, M.E. (1993). Cognition and life stress in depression: Cognitive factors and the definition, rating, and generation of negative life events. *Journal of Abnormal Psychology*, 102:584-591.
- Stein, M.J., Wallston, K.A., & Nicassio, P.M. (1988a). Factor structure of the Arthritis

- Helplessness Index. *The Journal of Rheumatology*, 15(3): 427-432.
- Stein, M.J., Wallston, K.A., Nicassio, P.M., & Castner, N.M. (1988b). Correlates of a clinical classification schema for the arthritis helplessness subscale. *Arthritis & Rheumatism*, 31(7): 876-881.
- Strober, L. & Arnett, P.A. (2009). Depression in Multiple Sclerosis (MS): What do our measures actually tell us? Paper presented at: International Neuropsychological Society 37th Annual Meeting; February 14, 2009; Atlanta, Georgia.
- Sullivan, M.J., Weinshenker, B., Mikail, S., & Edgley, K. (1995). Depression before and after diagnosis of multiple sclerosis. *Multiple Sclerosis*, 1(2): 104-108.
- Sweeney, P.D., Anderson, K., & Bailey, S. (1986). Attributional style in depression: a meta-analytic review. *Journal of Personality and Social Psychology*, 50(5): 974-991.
- Swingler, R.J., Compston, D.A. (1992). The morbidity of multiple sclerosis. *QJ Med*, 93(300): 325-337.
- Tabachnick, B. G., & Fidell, L. S. (2000). Using multivariate statistics (4th ed.): Pearson Allyn & Bacon. Wackerly, D., Mendenhall, W., & Scheaffer, R. L. (2001).
- Timbremont, B., & Braet, C. (2004). Cognitive vulnerability in remitted depressed children and adolescents. *Behaviour Research and Therapy*, 42: 423 – 437.
- Van der Werf, S.P., Evers, A., Jongen, P.J., & Bleijenberg, G. (2003). The role of helplessness as mediator between neurological disability, emotional instability, experienced fatigue and depression in patients with multiple sclerosis. *Multiple Sclerosis*, 9(1): 89-94.
- Wassem, R. (1991). A test of the relationship between health locus of control and the course of multiple sclerosis. *Rehabilitation Nursing*, 16(4): 189-193.
- Wells, K.B., Golding, J.M. & Burnam, M.A. (1988). Psychiatric Disorder in a Sample of the

General Population With and Without Chronic Medical Conditions. *The American Journal of Psychiatry*, 145 (8): 976-98.

Appendix A: Attributional Style Questionnaire

ASQ

Directions:

- 1) Read each situation and vividly imagine it happening to you.
- 2) Decide what you believe to be the one major cause of the situation if it happened to you.
- 3) Write this cause in the blank provided.
- 4) Answer the three questions about the cause by circling one number per question. Do not circle the words.
- 5) Go on to the next question.

YOU HAVE BEEN LOOKING FOR A JOB UNSUCCESSFULLY FOR SOME TIME.

1. Write down the one major cause: _____

2. Is the cause of your unsuccessful job search due to something about you or something about other people or circumstances?

Totally due to other people or circumstances	1 2 3 4 5 6 7	Totally due to me
-------------------------------------------------	---------------	-------------------

3. In the future, when looking for a job, will this cause again be present?

Will never again be present	1 2 3 4 5 6 7	Will always be present
--------------------------------	---------------	------------------------

4. Is the cause something that just influences looking for a job, or does it also influence other areas of your life?

Influences just this particular situation	1 2 3 4 5 6 7	Influences all situations in my life
----------------------------------------------	---------------	-----------------------------------------

A FRIEND COMES TO YOU WITH A PROBLEM AND YOU DON'T TRY TO HELP HIM/HER.

5. Write down the one major cause: _____

6. Is the cause of your not helping your friend due to something about you or something about other people or circumstances?

Totally due to other people or circumstances	1 2 3 4 5 6 7	Totally due to me
-------------------------------------------------	---------------	-------------------

7. In the future, when a friend comes to you with a problem, will this cause again be present?

Will never again	1 2 3 4 5 6 7	Will always be present
------------------	---------------	------------------------

be present

8. Is the cause something that just influences you when a friend comes to you with a problem, or does it also influence other areas of your life?

Influences just this
particular situation

1 2 3 4 5 6 7

Influences all
situations in my life

YOU GIVE AN IMPORTANT TALK IN FRONT OF A GROUP AND THE AUDIENCE REACTS NEGATIVELY.

9. Write down the one major cause: _____

10. Is the cause of the audience's negative reaction due to something about you or something about other people or circumstances?

Totally due to other
people or circumstances

1 2 3 4 5 6 7

Totally due to me

11. In the future when you give talks, will this cause again be present?

Will never again
be present

1 2 3 4 5 6 7

Will always be present

12. Is the cause something that just influences giving talks, or does it also influence other areas of your life?

Influences just this
particular situation

1 2 3 4 5 6 7

Influences all
situations in my life

YOU MEET A FRIEND WHO ACTS HOSTILELY TOWARD YOU.

13. Write down the one major cause: _____

14. Is the cause of your friend acting hostile due to something about you or something about other people or circumstances?

Totally due to other
people or circumstances

1 2 3 4 5 6 7

Totally due to me

15. In the future when interacting with friends, will this cause again be present?

Will never again
be present

1 2 3 4 5 6 7

Will always be present

16. Is the cause something that just influences interacting with friends, or does it also influence other areas of your life?

Influences just this particular situation

1 2 3 4 5 6 7

Influences all situations in my life

YOU CAN'T GET ALL THE WORK DONE THAT OTHERS EXPECT OF YOU.

17. Write down the one major cause: _____

18. Is the cause of your not getting the work done due to something about you or something about other people or circumstances?

Totally due to other people or circumstances

1 2 3 4 5 6 7

Totally due to me

19. In the future when doing work that others expect, will this cause again be present?

Will never again be present

1 2 3 4 5 6 7

Will always be present

20. Is the cause something that just affects doing work that others expect of you, or does it also influence other areas of your life?

Influences just this particular situation

1 2 3 4 5 6 7

Influences all situations in my life

YOU GO OUT ON A DATE AND IT GOES BADLY.

21. Write down the one major cause: _____

22. Is the cause of date going badly due to something about you or something about other people or circumstances?

Totally due to other people or circumstances

1 2 3 4 5 6 7

Totally due to me

23. In the future when you are dating, will this cause again be present?

Will never again be present

1 2 3 4 5 6 7

Will always be present

24. Is the cause something that just influences dating, or does it also influence other areas of your life?

Influences just this particular situation

1 2 3 4 5 6 7

Influences all situations in my life

Appendix B. Multiple Sclerosis Attitudes Index

MSAI

The following 5 items relate to your perceptions of how your MS is affecting your life. Circle the one number for each item that best applies to you.

1. MS is controlling my life.

Not at all	A little	Moderately	Quite a bit	Extremely
1	2	3	4	5

2. I would feel helpless if I couldn't rely on other people for help with my MS.

Not at all	A little	Moderately	Quite a bit	Extremely
1	2	3	4	5

3. No matter what I do, or how hard I try, I just can't seem to get relief from my MS symptoms.

Not at all	A little	Moderately	Quite a bit	Extremely
1	2	3	4	5

4. I am coping effectively with my MS.

Not at all	A little	Moderately	Quite a bit	Extremely
1	2	3	4	5

5. It seems as though fate and other factors beyond my control affect my MS.

Not at all	A little	Moderately	Quite a bit	Extremely
1	2	3	4	5

Appendix C. Chicago Multiscale Depression Inventory

The following items describe feelings or experiences people have. Read each item carefully. Then circle the number of the phrase that best describes you during the past week, including today. Circle only one number for each word. Try to answer every item.

	Not at all	A Little	Moderately	Quite A Bit	Extremely		Not at all	A Little	Moderately	Quite A Bit	Extremely
1. sad.....	1	2	3	4	5	26. criticized....	1	2	3	4	5
2. joyful.....	1	2	3	4	5	27. fatigued....	1	2	3	4	5
3. unworthy.....	1	2	3	4	5	28. forgetful....	1	2	3	4	5
4. easily awakened...	1	2	3	4	5	29. capable....	1	2	3	4	5
5. inferior.....	1	2	3	4	5	30. dreary....	1	2	3	4	5
6. unable to pay attention.....	1	2	3	4	5	31. trouble falling....	1	2	3	4	5
7. glum.....	1	2	3	4	5	asleep					
8. exhausted.....	1	2	3	4	5	32. grim....	1	2	3	4	5
9. woeful.....	1	2	3	4	5	33. rejected....	1	2	3	4	5
10. blue.....	1	2	3	4	5	34. despairing....	1	2	3	4	5
11. worthless.....	1	2	3	4	5	35. happy....	1	2	3	4	5
12. unhappy.....	1	2	3	4	5	36. weak....	1	2	3	4	5
13. punished.....	1	2	3	4	5	37. gloomy....	1	2	3	4	5
14. tired.....	1	2	3	4	5	38. forgotten....	1	2	3	4	5
15. sluggish.....	1	2	3	4	5	39. active....	1	2	3	4	5
16. cheerless.....	1	2	3	4	5	40. sorrowful....	1	2	3	4	5
17. energetic.....	1	2	3	4	5	41. somber....	1	2	3	4	5
18. a failure.....	1	2	3	4	5	42. useless....	1	2	3	4	5
19. low.....	1	2	3	4	5	43. miserable....	1	2	3	4	5
20. loved.....	1	2	3	4	5	44. alert....	1	2	3	4	5
21. unable to concentrate.....	1	2	3	4	5	45. resented....	1	2	3	4	5
22. poor appetite.....	1	2	3	4	5	46. uninterested	1	2	3	4	5
23. despised.....	1	2	3	4	5	in sex					
24. hated.....	1	2	3	4	5	47. unwanted....	1	2	3	4	5
25. fitful sleep.....	1	2	3	4	5	48. peaceful....	1	2	3	4	5
						49. restless....	1	2	3	4	5
						50. deserted....	1	2	3	4	5

Appendix D. **Beck Depression Inventory- Fast Scale (BDI-FS)** (Taken from the BDI-II)

1. 0 I do not feel sad.
 1 I feel sad much of the time.
 2 I am sad all the time.
 3 I am so sad or unhappy that I can't stand it.

2. 0 I am not discouraged about my future.
 1 I feel more discouraged about my future than I used to be.
 2 I do not expect things to work out for me.
 3 I feel that my future is hopeless and will only get worse.

3. 0 I do not feel like a failure.
 1 I have failed more than I should have.
 2 As I look back, I see a lot of failures.
 3 I feel I am a total failure as a person.

4. 0 I get as much pleasure as I ever did from the things I enjoy.
 1 I don't enjoy things as much as I used to.
 2 I get very little pleasure from the things I used to enjoy.
 3 I can't get any pleasure from the things I used to enjoy.

7. 0 I feel the same about myself as ever.
 1 I have lost confidence in myself.
 2 I am disappointed in myself.
 3 I dislike myself.

8. 0 I don't criticize or blame myself more than usual.
 1 I am more critical of myself than I used to be.
 2 I criticize myself for all of my faults.
 3 I blame myself for everything bad that happens.

9. 0 I don't cry anymore than I used to.
 1 I cry more than I used to.
 2 I cry over every little thing.
 3 I feel like crying, but I can't.

Appendix E. The Hassles and Uplifts Scale

HASSLES are irritants—things that annoy or bother you; they can make you upset or angry. **UPLIFTS** are events that make you feel good; they can make you joyful, glad, or satisfied. Some hassles and uplifts occur on a fairly regular basis and others are relatively rare. Some have only a slight effect, others have a strong effect.

This questionnaire lists things that can be hassles and uplifts in day-to-day life. You will find that some of these things will have been only a hassle for you and some will have been only an uplift. *Others will have been both a hassle AND an uplift.*

DIRECTIONS: Please think about how much of a hassle and how much of an uplift each item was for you **in the past month**. Please indicate on the left-hand side of the page (under “HASSLES”) how much of a hassle the item was by circling the appropriate number. Then indicate on the right-hand side of the page (under “UPLIFTS”) how much of an uplift it was for you by circling the appropriate number.

Remember, circle one number on the left-hand side of the page AND one number on the right-hand side of the page for EACH item.

HASSLES AND UPLIFTS SCALE

*How much of a hassle was this item for
You in the past month?*

HASSLES

- 0 = None or not applicable
1 = Somewhat
2 = Quite a bit
3 = A great deal

*How much of an uplift was this item for
you in the past month?*

UPLIFTS

- 0 = None or not applicable
1 = Somewhat
2 = Quite a bit
3 = A great deal

DIRECTIONS: Please circle one number on the left-hand side AND one number on the right-hand side for each item.

0 1 2 3	1. Your child(ren)	0 1 2 3
0 1 2 3	2. Your parents or parents-in-law	0 1 2 3
0 1 2 3	3. Other relative(s)	0 1 2 3
0 1 2 3	4. Your spouse	0 1 2 3
0 1 2 3	5. Time spent with family	0 1 2 3
0 1 2 3	6. Health or well-being of a family member	0 1 2 3
0 1 2 3	7. Sex	0 1 2 3
0 1 2 3	8. Intimacy	0 1 2 3
0 1 2 3	9. Family-related obligations	0 1 2 3
0 1 2 3	10. Your friend(s)	0 1 2 3

0	1	2	3	11. Fellow workers	0	1	2	3
0	1	2	3	12. Clients, customers, patients, etc.	0	1	2	3
0	1	2	3	13. Your supervisor or employer	0	1	2	3
0	1	2	3	14. The nature of your work	0	1	2	3
0	1	2	3	15. Your work load	0	1	2	3
0	1	2	3	16. Your job security	0	1	2	3
0	1	2	3	17. Meeting deadlines or goals on the job	0	1	2	3
0	1	2	3	18. Enough money for necessities (e.g., food, clothing, housing, health care, taxes, insurance)	0	1	2	3
0	1	2	3	19. Enough money for education	0	1	2	3
0	1	2	3	20. Enough money for emergencies	0	1	2	3
0	1	2	3	21. Enough money for extras (e.g., entertainment, recreation, vacations)	0	1	2	3
0	1	2	3	22. Financial care for someone who doesn't live with you	0	1	2	3
0	1	2	3	23. Investments	0	1	2	3
0	1	2	3	24. Your smoking	0	1	2	3
0	1	2	3	25. Your drinking	0	1	2	3
0	1	2	3	26. Mood-altering drugs	0	1	2	3
0	1	2	3	27. Your physical appearance	0	1	2	3
0	1	2	3	28. Contraception	0	1	2	3
0	1	2	3	29. Exercise(s)	0	1	2	3
0	1	2	3	30. Your medical care	0	1	2	3
0	1	2	3	31. Your health	0	1	2	3
0	1	2	3	32. Your physical abilities	0	1	2	3
0	1	2	3	33. The weather	0	1	2	3
0	1	2	3	34. News events	0	1	2	3
0	1	2	3	35. Your environment (e.g., quality of air, noise Level, greenery)	0	1	2	3
0	1	2	3	36. Political or social issues	0	1	2	3
0	1	2	3	37. Your neighborhood (e.g., neighbors, setting)	0	1	2	3

0	1	2	3	38. Conserving (gas, electricity, water, gasoline, etc)	0	1	2	3
0	1	2	3	39. Pets	0	1	2	3
0	1	2	3	40. Cooking	0	1	2	3
0	1	2	3	41. Housework	0	1	2	3
0	1	2	3	42. Home repairs	0	1	2	3
0	1	2	3	43. Yardwork	0	1	2	3
0	1	2	3	44. Car maintenance	0	1	2	3
0	1	2	3	45. Taking care of paperwork (e.g., paying bills, filling out forms)	0	1	2	3
0	1	2	3	46. Home entertainment (e.g., TV, music, reading)	0	1	2	3
0	1	2	3	47. Amount of free time	0	1	2	3
0	1	2	3	48. Recreation and entertainment outside the home (e.g., movies, sports, eating out, walking)	0	1	2	3
0	1	2	3	49. Eating (at home)	0	1	2	3
0	1	2	3	50. Church or community organizations	0	1	2	3
0	1	2	3	51. Legal matters	0	1	2	3
0	1	2	3	52. Being organized	0	1	2	3
0	1	2	3	53. Social commitments	0	1	2	3

Appendix F. **Coding Instructions for Attributional Style Questionnaire**

For each listed cause, you will determine whether the cause is MS-related or not and mark this on the coding sheet. If the person directly mentions MS in the cause then it is MS-related. If they describe symptoms that are in the list below, then the cause is also MS-related. If the cause is not related to MS or its symptoms then mark it as non-MS related. If you have any questions, please ask me.

List of the most common MS symptoms (from Swingler et al., 1992):

- Weakness
- Sensory symptoms (numbness, tingling)
- Ataxia (trouble coordinating muscle movement)
- Bladder symptoms (hard to control, urgency)
- Fatigue
- Cramps
- Diplopia (double vision)
- Visual Symptoms (trouble making out shapes or seeing colors, not being able to see one side of the visual field)
- Bowel Symptoms
- Dysarthria (slurring of speech)
- Vertigo (dizziness, trouble with balance)
- Facial pain
- Poor memory
- Headache
- Mental symptoms (cognitive dysfunction, trouble with mood, depression, trouble concentrating/focusing)
- Deafness
- Facial weakness
- Dysphagia (difficulty swallowing)
- Sores
- Blackout
- Ageusia (trouble tasting)

Appendix G: Causes listed by patients on the ASQ

Event 1: You have been looking for a job unsuccessfully for some time.

Age (x3)
can't do well on tests or work long hours
company not hiring
didn't present myself well
Difficulty focusing
diminishing physical abilities
disability
economy
Education
experience
Fatigue (x2)
fewer jobs
handicap discrimination
hard to find
have not kept up with applications
High unemployment
i am too selective
inability of physical activity
lack degree required
lack of a degree
lack of confidence
lack of education
lack of qualifications
lack of schooling
lack required skills
lack self confidence
MS (x4)
my MS, both cognitive and motor skills
my profession is not needed
no openings in my field
no skills
not looking in the right places
not prepared
not qualified (x3)
poor interview
retired
Salary (x2)
unable to find time frame suitable
Underqualified
unskilled
unwilling to move

vision problems
wasn't in God's plan for me

Event 2: A friend comes to you with a problem and you don't try to help him/her.

afraid of causing issues
can't help
concerns a mutual friend
conflict with another friend
Dealing with my own problems at the time
depends on problem
don't feel good
don't have an answer
don't have time, other committments
Don't know a solution
don't know how to help (x6)
don't want to feel responsible
don't want to get involved
don't want to take the time
fatigue
fear of becoming too involved
fear of blame if bad turnout
friend needs professional help
friendship
have previously not had a good outcome
having an MS episode
he/she must solve
i don't know how to answer it
i was working
inability
unable to physically help
it affects more than one friend
lack physical ability
my financial limitations
no expertise
not a close friend or i'm unavailable
not enough information
not motivated to help
pain
physical limitations
physically unable
previous advice unheeded
repeat problem with person
stress from other obligations making ill
the problem involves breaking the law

They didn't learn from their mistakes
too busy
too busy or tired
too busy with own problems
unable to devote time

Event 3: You give an important talk in front of a group and the audience reacts negatively.

am misunderstood, i used the wrong words
appearance
audience doesn't agree
audience doesn't agree with my viewpoint
audience doesn't understand topic
bad topic
can't project voice
did a lousy job
did not do enough research on subject
didn't get my point across
didn't have facts straight
didn't keep attention/interest
didn't know the material, not helpful
different opinions (x2)
disagreement
don't agree with opinions
don't like hearing the truth
don't understand
don't understand subject matter
embarrassment
i could care less what they thought
I didn't perform well
i said something unpopular
i'm a poor speaker
inable to process speech
lack of education
lack of knowledge on subject
misunderstanding
not adequately prepared
not properly prepared
point of view
poor clarity
poor job stating their concerns
poor preparation
poor presenter
poorly prepared (x4)
speak my mind

spoke too softly
subject is lousy for presentation
subject matter controversial
they don't agree with my point of view
uncomfortable speaking for large groups
use wrong words
viewpoint
wasn't interesting

Event 4: You meet a friend who acts hostilely toward you.

angry
attitude
bad day (x2)
bad mood
dating his wife
did something they didn't like
didn't agree with my actions
didn't keep plans
disagreement
fight
forgot an important occasion
friend is having a stressful situation
gossip from others
heard i said something that i did not
heard i said someting negative about him
heard rumors about me
i did something they didn't like
i may have caused pain unknowingly
I said or did something to make them mad
i'm tired
if they are a friend they won't
inattention
jealousy
late for a meeting with them
mad about something
may have said something to hurt feelings
Misunderstanding (x4)
misunderstood, i use wrong words
my attitude toward the friend
not there when they needed me
offended them
perception of how my health affects me
problem bothering them
really isn't a friend

something went wrong
speak my mind
that's their personality
the past
they are angry with me (x2)
they think i did/said something harmful
thought i ignored them
unknown
unresolved issue
upset them
upset with me
would try to find out why hostile

Event 5: You can't get all the work done that others expect of you.

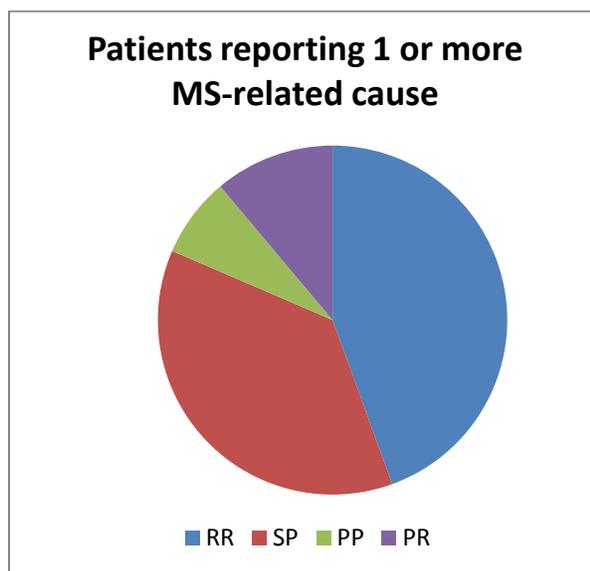
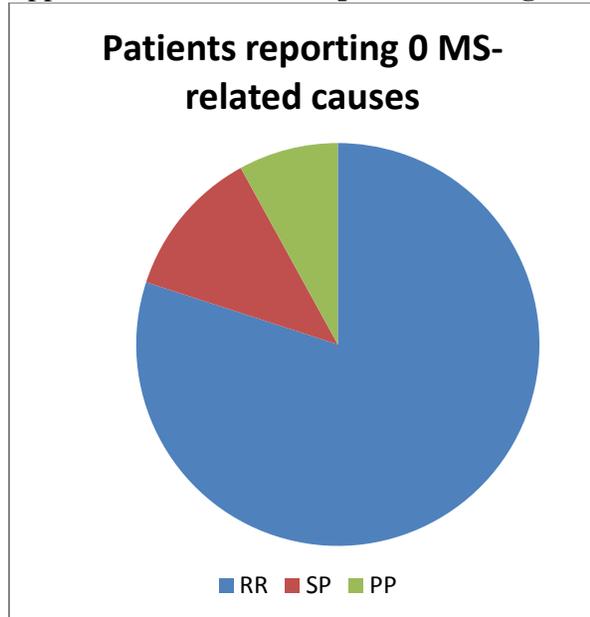
become ill
can't concentrate, unhappy with job
couldn't handle it
didn't start early enough, not diligent
disagreement over expectations
distracted by other problems
don't have proper tools
don't know how to say no
excessive work load
Fatigue (x5)
high expectations
high expectations of self
i lose energy
i'll ask my friends to help me
inability to focus
it's too much
move and think slowly
MS (x3)
MS fatigue and pain
my fatigue
my MS
nature of work, done well not haphazard
not a priority
not enough time (x2)
not physically able to work faster
pain
people expect too much
physical demand, time of day
physical limitations
procrastination, fatigue

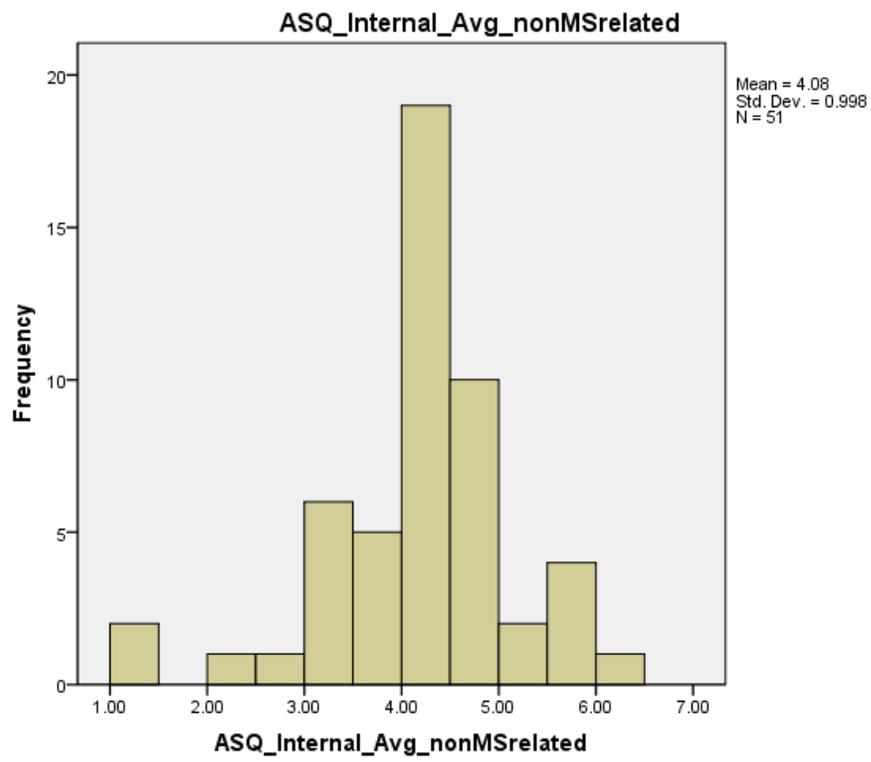
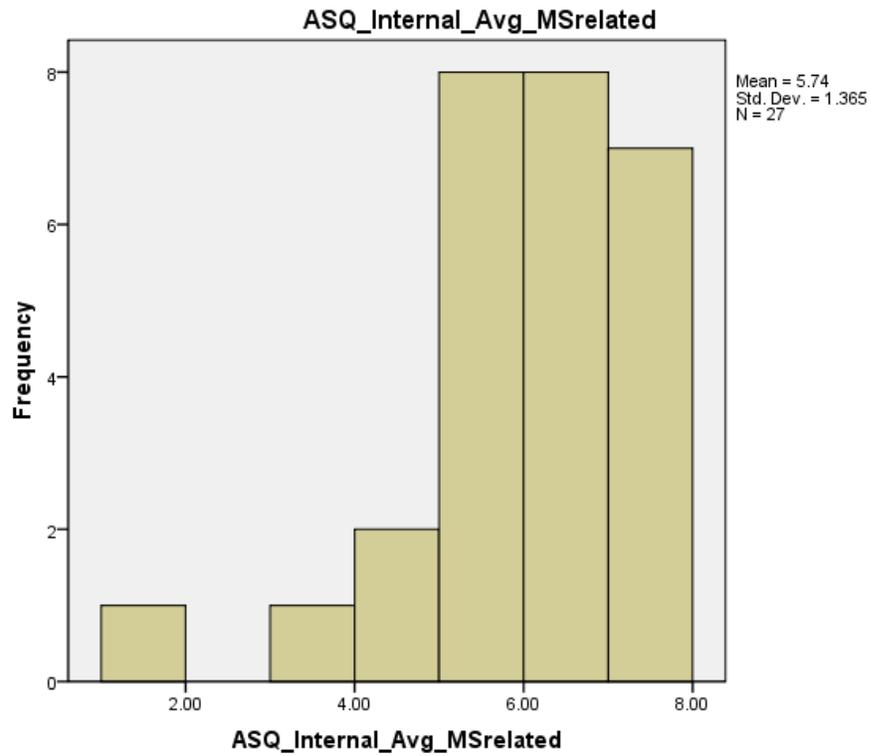
takes longer to complete complex work
tired
too difficult
too large work load
too many things to do
too much of a perfectionist
too much work (x2)
too much work and not enough time
too much work, need help
too slow
too tired
too tired, need help or assistance
want to do it right, too much work

Event 6: You go out on a date and it goes badly.

am misunderstood, i used the wrong words
bad personality
can't concentrate or be attentive
did not meet my expectations
different expectations (x2)
different interests (x3)
different plans
disinterest
don't connect
drinks too much
food wasn't good
he is a jerk (x2)
he's a jerk
I didn't like him
i expected too much, lack of communicati
i intimidate men
i was stressed about work
incompatibility
lack of understanding about health
Married (x2)
MS
NA
no common interest
no shared interests
not attracted, no chemistry
not compatable
not compatible (x6)
Not compatible
not for me

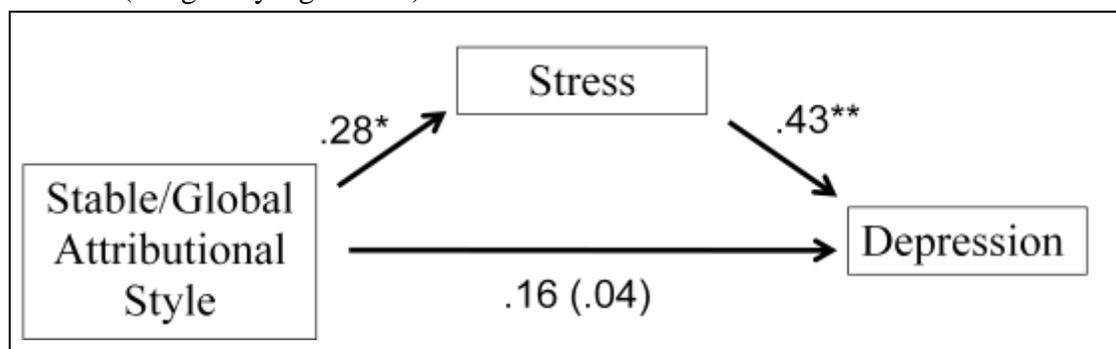
not meant for each other
nothing in common
physical demand at end of day
poor taste
said something wrong, bad conversation
self esteem
signals crossed
they were disappointed, i fell, spilled
tired
try too hard to please, forget my needs
we are not on the same page
we don't like each other
wrong person

Appendix H. Courses of patients listing none or one or more MS-related causes on the ASQ

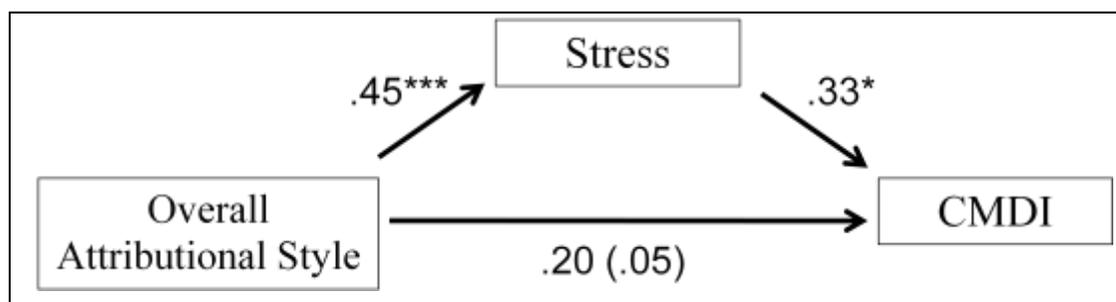
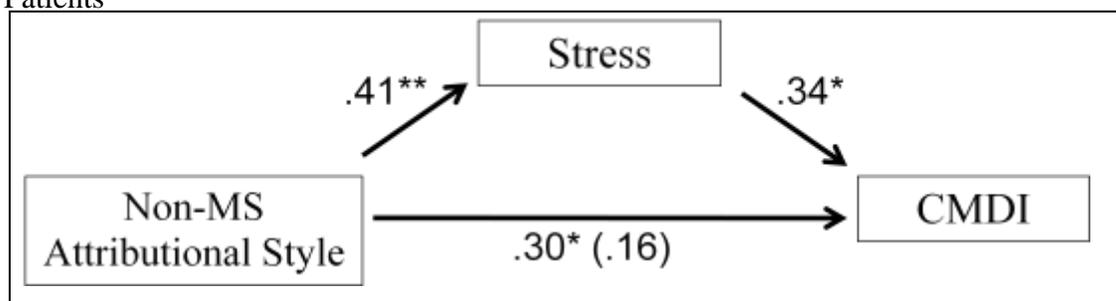
Appendix I: Distributions of internal attributions (MS and non-MS-related)

Appendix J. Mediation models

Controls (marginally significant)



Patients



*: $p < .05$; **: $p < .01$; ***: $p < .001$