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DEPRESSION IN THE MULTIPLE SCLEROSIS DYAD: THE ROLE OF DEPRESSION IN
THE RELATIONSHIP BETWEEN MS PATIENTS AND THEIR SIGNIFICANT OTHERS

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ABSTRACT

Multiple Sclerosis (MS) is a chronic inflammatory, neurodegenerative disease affecting the central nervous system (Tullman, 2013). Depression is highly prevalent in MS patients, with an estimated lifetime risk of 50% (Dennison, Moss-Morris, & Chalder, 2009). Research has demonstrated that levels of adjustment, including depression, between MS patients and their caregivers are highly correlated (Pakenham, 1998). Additionally, it has been shown that similarity in interpretation of symptoms between patients with chronic illness and their caregivers (reported symptom congruence) leads to more positive outcomes, including the use of more effective coping strategies (Klinedinst, Clark, Blanton, & Wolf, 2007). The purpose of the current study was to investigate levels of depression and reported symptom congruence between MS patients and their significant others in order to better understand depression and its subsequent relationship to social support in the context of MS. Fifty-four patients with MS (36 female, 18 male) were recruited for neuropsychological testing. The patients and their significant others filled out self-report measures including the Beck Depression Inventory II (BDI-II), Beck Depression Inventory Fast Screen (BDI-FS), the Chicago Multiscale Depression Inventory (CMDI), and the Social Support Questionnaire (SSQ). Significant other depression was found to be moderately correlated with patient depression when controlling for overall MS disability (as measured by the Expanded Disability Status Scale: EDSS), $r(46) = .35, p = .012$. Additionally, reported depressive symptom congruence was found to be related to more favorable patient outcomes, as patient-significant other CMDI difference scores were positively correlated with patient depression (as measured by the BDI-FS), $r(47) = .48, p < .01$. The results demonstrated that patient and significant other depression are closely linked, and that reported symptom congruence is a strong indicator of MS patient depression outcomes. This suggests that depressed MS patients might benefit from a conjoint approach that involves psychotherapeutic treatment of both patient and significant other simultaneously.

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Introduction

Background

Multiple Sclerosis (MS) is a chronic inflammatory, neurodegenerative disease affecting the central nervous system (Tullman, 2013). MS results in progressive deterioration of myelin, a fatty insulating layer that surrounds the axons of neurons (Goldenberg, 2012). Myelin is critical for proper central nervous system function, as it insulates neuronal axons, enabling the conduction of signals across the axon (Tomassy et al., 2014). Myelin has been shown to play critical roles in coordinating various complex neurological functions, including cognition and learning (Tomassy et al., 2014). Considering this, it is no surprise that MS results in a wide range of neurological deficits brought about by the destruction of myelin and axon fibers (Goldenberg, 2012). Although the symptoms and course of MS are highly variable, most patients experience reversible episodes of neurological deficits along with chronic progressive neurological deterioration (Goldenberg, 2012). While there is no known cause for MS, studies have suggested that a complex interaction of genetic susceptibility and environmental factors may be responsible for triggering the disease (Goldenberg 2012).

Multiple Sclerosis Epidemiology

MS is believed to affect over 2.5 million individuals throughout the world and approximately 400,000 in the United States (Dennison, Moss-Morris, & Chalder, 2009). MS affects females approximately 2.5 times more frequently than males (Arnett & Strober, 2014).

Additionally, individuals living in northern regions of the US are approximately 3 times more likely to have MS than those living in southern US regions (Arnett & Strober, 2014).

There is some evidence of a genetic link to MS, as those with a first-degree relative with MS are at a 20 to 40 times higher risk of acquiring the disease (Tullman, 2013). Twin studies have demonstrated a 30% concordance rate in monozygotic twins and a 5% concordance rate in dizygotic twins, providing strong evidence for a genetic link to MS (Tullman, 2013).

Diagnosis, Course, and Symptomatology of Multiple Sclerosis

Diagnosis of MS is somewhat complicated, as there is not a single diagnostic test that can definitively confirm the presence of disease (Goldenberg, 2012). Rather, the diagnosis of MS is based on the presence of lesions, including scars or plaques, in the central nervous system, the presence of symptomatic episodes, and the presence of chronic central nervous system inflammation (Goldenberg, 2012), disseminated by space or time. While there are four major categories of MS disease type based on course of disease, two main severity outcomes have been identified, with some 10% of patients experiencing severe disability within five years of disease onset, and the remainder experiencing varied symptoms for over 20 years or more of disease progression (Arnett & Strober, 2014). The four main categories used by neurologists to classify MS are as follows: relapsing-remitting, secondary progressive, primary progressive, and progressive-relapsing. Relapsing-remitting is the most common form of MS and is characterized by periods of exacerbated symptoms followed by periods of symptom remission (Goldenberg, 2012). Secondary progressive MS, unlike relapsing remitting MS, is characterized by periods of disease progression with or without periods of relapses and remission (Arnett & Strober, 2014).

In primary progressive MS, symptoms gradual increase with or without the presence of plateaus, but there are no periods of relapses and remission (Goldenberg, 2012). Lastly, progressive-relapsing MS is characterized by gradually worsening symptoms with the presence of flare-ups but no significant periods of remission (Goldenberg, 2012).

While research has suggested that MS is likely acquired before the teenage years, the onset of symptoms occurs in the majority of patients between 20 and 40 years of age (Arnett & Strober, 2014). MS manifests clinically in a variety of different forms, with common symptoms including tingling and numbness in the extremities, poor balance, and vision problems (Tullman, 2013). Muscle weakness is also commonly experienced shortly after the onset of illness (Arnett & Strober, 2014). Fatigue, depression and cognitive impairment are additional common features of MS (Arnett & Strober, 2014). Up to 70% of MS patients experience some form of cognitive impairment including deficits in information processing speed, long-term memory, executive functioning, and visual learning and memory (Chiaravalloti & DeLuca, 2008). Furthermore, studies have shown that depression is highly comorbid with MS, with up to 60% of MS patients also experiencing clinically significant depression (Chiaravalloti & DeLuca, 2008). Depression in MS and in significant others (spouses, caregivers, or close friends) of MS patients is the focus of this study and will be discussed further.

Multiple Sclerosis and Depression

While depression is highly prevalent among individuals with chronic disease, it is of particular interest in MS due to its especially high prevalence and potential to decrease quality of life (Arnett, Barwick, & Beeney, 2008). In 2009, Dennison, Moss-Morris, & Chalder reported

that the estimated lifetime risk of depression in individuals with MS is 50%, starkly contrasting with the estimated lifetime risk of depression among the general population of 10-15%. A wide range of research has investigated the effects of depression on MS disease progression, physical and psychological symptomatology, and overall quality of life. Additionally, a substantial body of literature also exists discussing the implications of depression on caregivers of MS patients, and the subsequent influence on social support.

Depression in Multiple Sclerosis Patients and their Significant Others

Depression in Patients

Studying depression in MS dyads is particularly relevant because of the great need for support that MS patients require throughout the progression of the disease. In this study, dyad refers to the MS patient and their significant other, who is generally a spouse but could also include close friend or caregiver. Furthermore, individuals with depression tend to have smaller, less effective support networks than those without depression, thus increasing the need for support from a significant other (Harris, Pistrang, & Barker, 2006). This kind of social support may act as a “buffer” to help an MS patient cope with depression (McIvor, Riklan, & Reznikoff, 1984).

Depression in Significant Others

Research on the marital unit of dyads experiencing chronic neurodegenerative disease has demonstrated that caregivers—not just care receivers—experience psychological problems attributable to the disease (Pakenham, 1998). For example, a study investigating the effects of depression on spouses and caregivers of Alzheimer’s Disease (AD) patients reported that AD

negatively influences the mental health of caregivers, with up to 80% of dementia caregivers reporting depression, anger, or chronic fatigue (Mittelman et al., 1995). Additionally, there is evidence to suggest that the difficulties of caring for a spouse with dementia lead to heightened levels of depression in caregivers compared to those who provide care to a spouse with strictly physical impairment (Mittelman et al., 1995). Other studies have suggested that neurological diseases including Alzheimer's Disease, Parkinson's Disease, and MS are associated with large amounts of social and emotional distress for caregivers (Figved, Myhr, Larsen, & Aarsland, 2007). Thus, it is clear that significant other depression is a significant issue in MS and is worthy of further study.

Effects of Depression on Dyad

Although there is a range of literature discussing depression among patients of chronic disease and their caregivers, less research has investigated the effects of depression on the relationship dyad and its subsequent effect on the health of the both patient and significant other. Research on depression in couples suggests that when one partner is depressed the other partner is at an increased risk for depression by means of negative interactions within the couple (McClure, Nezu, Nezu, O'Hea, & McMahan, 2012). The phenomenon of 'catching' depression has been termed the interactional model for depression (McClure, Nezu, Nezu, O'Hea, & McMahan, 2012). Kurtz et al. (1995) carried out a study that investigated problem solving and depression in cancer patients and their spouses. They demonstrated that disease progression, symptoms, and physical disability influence patients' levels and symptoms of depression, which subsequently impacts the caregivers' responses to these burdens. Additionally, the investigators found that depression in these patients and depression in caregivers were highly related. (Kurtz, Kurtz, Given, & Given, 1995). These findings have been extended to an MS

population in a limited fashion. For example, a study by Pakenham found that levels of adjustment, including depression, between MS patients and caregivers are highly correlated (Pakenham, 1998).

Relatedly, researchers have found that similarity in interpretation of symptoms between patients with chronic illness and their caregivers (reported symptom congruence) leads to more positive outcomes, including better coping (Klinedinst, Clark, Blanton, & Wolf, 2007). Furthermore, depression in caregivers is associated with reduced quality and effectiveness of caregiving and a variety of negative outcomes for patients (Klinedinst, Clark, Blanton, & Wolf, 2007).

With these considerations in mind, it appears that studying depression among MS patients and their significant others, as well as the levels of depressive symptom congruence, may be illuminating and ultimately help lead to better outcomes for both patients and caregivers. The purpose of this study is to investigate depression among MS patients and their significant others in order to better understand the effects of depression on the relationship dyad.

Predictions

Hypothesis 1: Patient depression will correlate positively with significant other depression

A range of research has demonstrated that depression among patients and caregivers is correlated. For example, McClure, Nezu, Nezu, O'Hea, & McMahon (2012) explain that when one partner in a dyad is depressed, this puts the other partner at risk for depression. Additionally, Pakenham (1998) found that depression levels of MS patients and caregivers were positively correlated. Thus, it is predicted that Beck Depression Inventory Fast-Screen (BDI-FS) scores of

MS patients will be positively correlated with Beck Depression Inventory II (BDI-II) depression levels of their significant others. BDI-FS will be used for the MS patients because it eliminates neurovegetative items that could be due to MS symptoms and not depression.

Hypothesis 2: Perceived social support will correlate inversely with patient depression

McIvor, Riklan, & Reznikoff (1984) report that social support, may act as a “buffer” to help an MS patient cope with depression. Thus, it is hypothesized that if an MS patient feels socially supported, it is less likely they will suffer from depression than an individual who does not feel supported. In other words, social support may mitigate the negative effects of depression. On the other hand, an individual who is predisposed to depression due to MS may be more likely to experience depression in the absence of social support than a similar individual who receives sufficient social support.

Hypotheses 3: Patient and significant other reported symptom congruence will relate to more favorable outcomes for MS patients and their significant others

Klinedinst, Clark, Blanton, & Wolf (2007) found that similarity in interpretation of symptoms between patients with chronic illness and their caregivers (reported symptom congruence) leads to more positive outcomes. In this case, reported symptom congruence refers to how accurately a significant other evaluates their partner’s depression symptoms, as compared to the patient’s self report of their own depression symptoms. Klinedinst, Clark, Blanton, & Wolf’s (2007) finding has not been extended to an MS population, but it is hypothesized that the relationship will hold in this sample. Specifically, high levels of reported depressive symptom congruence (small differences in patient and significant other CMDI scores) are hypothesized to be inversely correlated with patient depression (BDI-FS) and significant other depression (BDI-II). Additionally, it is hypothesized that reported depressive symptom congruence will be

positively correlated to perceived social support (SSQ) in patients. Lastly, it is predicted that under conditions of low depressive symptom congruence (large differences between patient and significant other CMDI ratings), underestimates, as opposed to over estimates, of patient symptoms by significant others will be positively correlated with patient depression (BDI-FS). In other words, when symptom congruence is low, significant others will report lower perceived depressive symptoms of the patient than the patient reports of themselves.

Method

Participants

Patients

The majority of the participants were woman (38, with 16 men), for a total of 54 participants. The average age of the participants was 52.6 years. The average MS diagnosis duration was 16 years, with 39 participants reporting a relapsing-remitting course of MS, 12 reporting a secondary progressive course, 2 reporting a primary progressive course, and 1 reporting a progressive relapsing. The average number of years of education among the MS participants was 14.7 years (see Appendix A, Tables 1 and 2).

Significant Others

Patients were asked to select one individual “who knows them best” to complete a set of questionnaires including the Beck Depression Inventory Fast-Screen (BDI-FS) to assess their own depression and the Chicago Multiscale Depression Inventory (CMDI) to assess their perception of the patient’s depression. The significant others included spouses and close friends of the participants. The average age of the significant others was 54.3 years old and average number of years of education was 14.0 years (See Appendix A, Tables 1 and 3).

Descriptions of Measures

Expanded Disability Status Scale

The Expanded Disability Status Scale (EDSS) is a widely used measure of physical disability in MS (Pakenham, 1998). The scale ranges from 0 (no impairment) to 10 (death). The

ratings are obtained through a standard neurological examination or self-report, and provided a measure of functional impairment produced by neurological impairment within 8 functional systems (Pakenham, 1998). In this study, EDSS was used to as a rough metric of disease severity and physical disability due to MS. Interviews were carried out by Penn State clinical psychology graduate students trained to administer neuropsychological evaluations and EDSS assessment was determined by Dr. Peter Arnett, who derived total scores based on self-report data.

Chicago Multiscale Depression Inventory

The Chicago Multiscale Depression Inventory is a self-report measure of depression that is divided into mood, evaluative, and neurovegetative subscales (Arnett and King, 2005). The scale has been found to be reliable, factorially valid, and internally consistent when evaluating depression in MS patients (Chang et al., 2003). The CMDI is a longer, more comprehensive self-test of depression compared to the BDI-II, and thus was well suited as a measure of reported symptom congruence between MS patients and significant others. The following CMDI subscales were used in this study: CMDI Overall (includes mood, evaluative, and vegetative subscales), CMDI Mood + Evaluative (includes only the mood and evaluative CMDI subscales), and CMDI Vegetative (includes only the vegetative subscale). Each subscale was calculated by summing the items relevant to that subscale while excluding all other items.

Social Support Questionnaire

The Social Support Questionnaire (SSQ) is a self-report measure that provides a measure of perceived social support based on a subject's rating of number of supports and their satisfaction with those supports (Sarason, Levine, Basham, & Sarason, 1983). The MS participants in this study provided these ratings in response to questions such as "Who can you really count on to listen to you when you need to talk?" or, "Whom can you really count on to be

dependable when you need help?” Evaluations of the SSQ have found that it is a reliable tool for evaluating social support (Sarason, Levine, Basham, & Sarason, 1983). Therefore, the SSQ was used in this study as a measure of patients’ perceived social support. The variable “SSQ - Overall” was used, and it is defined by the sum of the patient’s self reported number of supports (0-9) and satisfaction with those supports (0-6).

Beck Depression Inventory-II

The Beck Depression Inventory-II (BDI-II) is a revision of the original Beck Depression Inventory (BDI). The BDI-II is a 21 item self-report questionnaire and is one of the most widely used measures for evaluating depression in patients. The BDI-II has been shown to be a valid measure within a wide variety of groups, including adult psychiatric outpatients (Arnau, Meagher, Norris, & Bramson, 2001). Research has shown that the BDI-II possesses high levels of internal consistency, convergent validity, and test-retest reliability (Arnau, Meagher, Norris, & Bramson, 2001). Thus, it was deemed a suitable measure of depression among MS patients and significant others for this study. The BDI-II total scores were calculated by summing the participant’s responses from each individual question on the BDI-II.

Beck Depression Inventory Fast-Screen

The Beck Depression Inventory Fast-Screen (BDI-FS) is a 7-item abbreviated version of the BDI-II. The BDI-FS has been found to have high levels of concurrent and discriminative validity when used with MS patients (Benedict, Fishman, McClellan, Bakshi, & Weinstock-Guttman, 2003). Furthermore, the BDI-FS has been shown to correlate strongly with a variety of other tests and indicators of depression within in MS sample (Benedict, Fishman, McClellan, Bakshi, & Weinstock-Guttman, 2003). Advantages of the BDI-FS for use in MS include its

brevity, ease of completion for patient, absence of neurovegetative symptoms that overlap with MS symptoms, and a high level of validity overall. The BDI-FS total scores were calculated by summing the participant's responses from each individual question on the BDI-II.

Description of Data Collection Method/Statistical Measures

Patients were mailed a "patient" packet, which included the BDI-II, CMDI, and SSQ. Significant others were mailed a separate packet, which included the BDI-II (Self-Rating) and CMDI (Rating of Significant Other). All participants were asked to fill out the questionnaires and bring them back to the Penn State University at a later date, at which point the patients would undergo a psychosocial interview and neuropsychological testing. All of the data were collected and scored by two separate undergraduate research assistants to ensure accuracy. The data were then analyzed in SPSS. The methods used to analyze the data are described below.

Description of Analyses and Calculations

The Statistical Package for the Social Sciences (SPSS), version 22.0 was used to perform all data analyses in this study. An alpha of $p < .05$ was used as a cutoff for statistical significance. Correlational analysis (2-tailed), stepwise linear regression, and independent sample t-tests were used to analyze the data.

To calculate depression symptom congruence, a difference score (CMDI - Difference) was created by subtracting patient CMDI scores from significant other reported CMDI scores of the patient. Another variable, CMDI - Difference - Abs, was created by taking the absolute value of the calculated difference score.

Results

Descriptive statistics of the MS patients and significant others, including age, sex, education, MS course, and EDSS were calculated and are displayed in Appendix A, Tables 1-3.

Two tailed correlational analyses were performed on all dependent variables to determine if any variables would need to be controlled for during linear regression. The correlations are displayed in Appendix A, Table 4. An alpha of $p < .05$ was used as a cutoff for statistical significance. EDSS was found to be correlated with patient depression and trending toward significance, $r(53) = .26, p = .054$ so it was controlled for in the subsequent analyses. Sex was found to be correlated with Social Support (SSQ - Overall), $r(53) = .31, p = .023$. Lastly, diagnosis duration was found to be correlated with Social Support (SSQ – Overall), $r(52) = .29, p = .034$. Therefore, both sex and diagnosis duration were controlled for when evaluating the relationship between reported symptom congruence and perceived social support.

Patient and Significant Other Depression

Stepwise linear regression was performed to determine the relationship between patient and significant other depression. EDSS was controlled for at step 1, while significant other depression was entered at step 2. The results demonstrated that significant other depression was moderately correlated with patient depression when controlling for EDSS, $r(46) = .35, p = .012$ (see Appendix B, Figure 1).

A linear regression was subsequently carried out to determine the relationship between patient depression (BDI-FS) and perceived social support (SSQ - Overall). The results showed that after controlling for EDSS, patient depression was weakly negatively correlated with perceived social support, but was not significant. $r(51) = -.20, p = .143$. The results are summarized in Appendix A, Table 5.

Reported Symptom Congruence, Depression, and Perceived Social Support

Next, linear regressions were performed to determine the relationship between reported symptom congruence and patient depression, significant other depression, and perceived social support. The results demonstrated that absolute reported symptom congruence on the CMDI was moderately correlated with patient depression $r(45) = .45, p < .01$. Absolute reported symptom congruence on the CMDI combined Mood + Evaluative subscale was also similarly positively correlated with patient depression, $r(47) = .481, p < .01$ (see Appendix B, Figure 2). No significant correlation was found when using the CMDI vegetative subscale. The same analyses were also carried out using reported symptom congruence instead of absolute symptom congruence as the independent variable and all correlations remained of similar strength and were significant. The results are summarized in Appendix A, Table 5.

Absolute reported symptom congruence on the CMDI was also found to be correlated with significant other depression, although the correlation only trended towards significance, $r(53) = .30, p = .069$). Additionally, reported symptom congruence was found to be weakly inversely correlated with patient ratings of overall social support but not significant at the .05 level, $r(34) = -.27, p = .116$). Lastly, EDSS was not found to be significantly correlated with significant other CMDI ratings of the patient. The results of the all of the above analyses are also summarized in Appendix A, Table 5.

Subjects were then divided into high and low congruence groups. The groups were determined via a median split, with the low congruence group defined by a CMDI difference score of 4 or greater and the high congruence group defined by a CMDI score of less than 4. Independent sample t-tests were then performed on the two groups to determine if any significant differences existed between the two groups on a variety of variables, including age, education,

EDSS, and disease duration. No significant differences were found (see Appendix A, Table 6) so a t-test was performed to determine differences in patient depression (BDI-FS) between the groups high and low congruence CMDI groups. The low congruence group was found to have significantly higher levels of depression than the high congruence group [$F(1,46) = 4.98, p = .007$]. The results are displayed in Appendix A, Table 6 and Appendix B, Figure 3.

Discussion

Discussion of Findings

The purpose of this study was to investigate levels of depression and reported symptom congruence between MS patients and their significant others in order to better understand depression and its subsequent relationship to social support in the context of MS. The relationship between patient and significant other depression was measured, along with the relationship of depression to social support and reported symptom congruence to patient depression, significant other depression, and levels of perceived social support.

The results support the first hypothesis, which stated that patient depression would be positively correlated with significant other depression. This supports previous findings, including the interactional model of depression proposed in 2012 by McClure, Nezu, Nezu, O'Hea, and McMahon, which suggested that patient and significant other symptoms affect one another and that negative interactions influence symptoms of depression in the dyad. Thus, it is reasonable to infer that coping with the physical and cognitive symptoms of MS is a challenge for both patients and significant others, and that the burdens of providing care to an MS patient may contribute to significant other depression, which in turn could further exacerbate patient depression. This finding also suggests that when treating depression in MS patients, the mental health of the spouse should be taken into account. It may be more valuable to treat depression in MS in the context of the marital unit, rather than treating the patient alone. It may also be valuable to focus on ways to help ease caregiver burdens, at least to provide coping strategies for caregivers.

The second hypothesis, which stated that perceived social support would be inversely correlated with patient depression, was partially supported. Although the relationship was not

found to be statistically significant, there was an inverse correlation with a weak to moderate effect size. While the lack in statistical significance of this finding may be in part due to the small sample size of this study, this relationship is still consistent with previous research, which has shown that those with depression have smaller and less effective support networks (Harris, Pistrang, & Barker, 2006). However, the direction of the relationship between depression and social support is still unclear. It is possible that MS patients with depression seek out less support than those without depression, or that individuals who perceive less support from others are less likely to seek help for their depression than those who perceive themselves as having more social support. Regardless, it appears as though lack of social support is a risk factor for depression in MS and thus should be a focus of both prevention and treatment of depression in MS.

The third hypotheses centered on reported symptom congruence. It was hypothesized that patient and significant other reported symptom congruence would be inversely related to patient depression and significant other depression, and positively related to perceived social support. Additionally, it was hypothesized that underestimates of patient symptoms by significant others would be positively correlated with patient depression. The results demonstrated that reported symptom congruence was indeed significantly inversely correlated with patient depression. In other words, the more similar the patient and significant other were in their ratings of patient depressive symptoms, the lower the patients' depression tended to be. These correlations held when using CMDI total score (includes Mood, Evaluative, Vegetative subscales) and the combined Mood + Evaluative subscale. However, there was no correlation between symptom congruence and depression when using the Vegetative subscale, suggesting that the relationship may be primarily driven by reports of the mood and negative cognitive elements of depression as opposed to neurovegetative components. This assertion is also supported by the fact that EDSS

was not found to be significantly correlated with significant other CMDI ratings of the patient, suggesting that significant other ratings of patient depression were not driven by perceptions of the debilitating physical symptoms of MS. Additionally, no significant demographic differences between dyads of low and high congruence groups were found. These results support prior findings that high levels of reported symptom congruence in depressed individuals and their significant others leads to better outcomes and better coping (Klinedinst, Clark, Blanton, & Wolf (2007). Although the finding that reported symptom congruence was positively correlated with perceived social support was not found to be significant at the $p < .05$ level after controlling for age and disease duration, the small to moderate effect size suggests that symptom congruence may also be related to more effective social support. A larger sample size may provide the statistical power to determine if this relationship is indeed significant. Lastly, the fact reported symptom congruence was found to be weakly inversely correlated with significant other depression (trending towards significance) suggests that more depressed significant others were less accurate in their evaluations of their partner's depression.

There are several explanations for why high levels of reported symptom congruence may lead toward better outcomes for patients and significant others. In the case of significant others underestimating patient symptoms (low levels of congruence), it is possible that the significant other fails to provide the patient adequate support since they are unaware of the severity and extent of the patient's symptoms. This lack of support may contribute to poorer depression outcomes in these patients, relative to patients whose significant others accurately identify the severity and extent of the patients' symptoms. This is consistent with the finding that low levels of reported symptom congruence were also related to lower levels of perceived social support. On the other hand, overestimates of the patients' symptoms may indicate that significant others

are overcompensating for the patients' symptoms and may be providing support in a way that the patients perceive to be overbearing. This could lead the patient to feel inadequate or incapable of completing tasks of everyday living. These feelings of poor self-efficacy could contribute to the patients' depression or undermine psychotherapeutic treatment that the patient is receiving.

Overall, the findings on symptom congruence in this study suggest that interventions intended to reduce depression in MS should focus on improving symptom congruence between patients and caregivers. Focusing on interpersonal communication may be a valuable component of such interventions, since it stands to reason that the more patient and caregiver communicate, the more likely they would be on the same page regarding symptoms of disease. Evaluating the quality of communication and its effect on reported symptom congruence would be an interesting avenue of future research. Since reported symptom congruence was found to be related to significant other depression, interventions targeting symptom congruence could potentially provide great benefit to significant others in addition to MS patients.

It is clear from this study and prior research that mental health of patients and their caregivers are closely tied. This study found that patient depression, significant other depression, social support, and reported symptom congruence are all closely related. Overall, the results of this study suggest that healthcare professionals should take care to obtain information from both MS patients and their caregivers in order to provide the most effective treatment.

Limitations and Future Research

The current study had a few limitations. First, the sample size was relatively small. Future work would benefit from a larger sample size of both MS patients and significant others. Since a few of the findings in this study were non-significant correlations with small to moderate effect sizes, a larger sample size may provide the necessary statistical power to determine if these relationships are indeed significant. Along with this, there was relatively sparse data collected on the significant others compared to the patients. With a larger sample size and more data, it would be easier to focus on more specific qualities of significant others and gain more insight into dyadic processes in MS. For example, data on the duration of relationship between patient and significant other would be an interesting factor to consider in future analyses. Along with this, not all of the significant others in the study were the spouses of the patients. While the majority were, it would be helpful to have a sample in which all of the significant others were spouses of the patients so that the research could focus in on marital processes, such as types of interpersonal communication and marital conflict. In particular, relating communication style and quality between patients and their spouses and relating this to patient depression outcomes could add valuable information to our current understanding of dyadic processes in MS. Additionally, taking a closer look at coping strategies could be a useful avenue of future research, since prior studies have demonstrated that evaluating congruency in coping strategies can also be a useful way to investigate outcomes in relationships between patients and their caregivers (Pakenham 1998). Lastly, other characteristics of patient and significant others, such as gender differences, use of antidepressants, and past medical history should be considered for future research.

Another limitation of this study is that the data were correlational, leaving uncertainty regarding the direction of certain relationships. Although care was taken to control for potential confounds, the presence of such extra variables cannot be completely ruled out. For example, when examining levels of depression and social support, it is unclear whether depression leads patients with MS to seek out less social support than non-depressed individuals, or whether less social support leads to depression in MS patients. It is also possible that individuals who perceive less support are less motivated to seek treatment or help for depression-related symptoms, thus even further complicating the picture.

The fact that self-report measures were used to evaluate depression, as opposed to a clinical diagnosis by a physician or other provider, is also a limitation of this study. Self-report measures can be particularly problematic for evaluating individuals with depression because depressed individuals have a tendency to rank items pertaining to themselves more negatively than they actually are (King & Arnett, 2005). These negative affective and cognitive biases could play a role in patients evaluating their own depression symptoms more negatively than do their significant others. Further investigating the presence of these negative biases and controlling for them if necessary would be advisable for future research involving reported symptom congruence in MS.

Lastly, since this research clearly demonstrates the value of considering both patient and significant other's depressive symptomatology in treatment, evaluating the efficacy of conjoint therapy in the treatment of depression in MS would be a logical next step. Doing so would provide information regarding the clinical utility of such treatments for reducing depression in MS.

Conclusions

This study investigated levels of depression, social support, and reported symptom congruence between multiple sclerosis patients and their significant others. The results demonstrated that patient and significant other depression are closely linked, and that reported symptom congruence is a strong indicator of MS patient depression outcomes. In all cases, high levels of similarity between patient and significant other symptom rankings were related to more favorable outcomes for both MS patients and their significant others. Thus, it is clear from this study that the relationship between MS patients and their significant others plays a vital role in the mental health of both members of the dyad. Furthermore, it suggests that healthcare professionals should take care to obtain information from both MS patients and their caregivers in order to provide the most effective treatment, and that further steps should be taken towards developing and implementing psychotherapeutic treatments that focus on the MS patient, their significant other, and the relationship between the two. Overall, it appears as though depressed MS patients could greatly benefit from a conjoint approach that involves treatment of both patient and significant other simultaneously.

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Appendix A

Table 1: Patient and Significant Other Demographics

	N	Mean	Standard Deviation
Patient age (years)	54	52.57	11.44
Patient education (years)	54	14.80	1.96
Significant other age (years)	42	54.33	11.04
Significant other education (years)	42	14.0270	2.36

Table 2: Patient MS Course Type

MS Course Type	Number of Subjects
Relapsing-Remitting	39
Secondary Progressive	12
Primary Progressive	2
Progressive Relapsing	1

Table 3: Significant Other Health Ratings

Significant Other Health	Number of Subjects
Excellent	15
Good	23
Fair	3
Poor	1
Unknown	8

Table 4: Correlations

Dependent Variables

	Patient Depression (BDI-FS)	Significant Other Depression (BDI-II)	Perceived Social Support (SSQ – Overall)
BDI-FS	—	$r = .389^{**}$ $p = .006$	$r = -.223$ $p = .104$
BDI-II	$r = .389^{**}$ $p = .006$	—	$r = -.102$ $p = .485$
SSQ - Overall	$r = -.223$ $p = .104$	$r = -.102$ $p = .485$	—
Age	$r = -.062$ $p = .658$	$r = -.101$ $p = .488$	$r = .027$ $p = .848$
Sex	$r = -.085$ $p = .54$	$r = -.138$ $p = .344$	$r = .309^*$ $p = .023$
Education	$r = -.245$ $p = .075$	$r = -.081$ $p = .581$	$r = -.046$ $p = .742$
EDSS	$r = .264$ $p = .054$	$r = .165$ $p = .257$	$r = -.105$ $p = .451$
Diagnosis Duration	$r = -.087$ $p = .538$	$r = .139$ $p = .346$	$r = .291^*$ $p = .034$

* denotes significance at the $p < .05$ level.**Bold** cells indicate that the variable was controlled for in analyses involved in the given dependent variable

Table 5: Linear Regression Results

Dependent Variable	[Covariate(s)], Predictor(s)	Standard Coefficient (B)	t-test (t)	Significance (p)
PT Depression (BDI-FS)	[EDSS], SO Depression	.350	2.625	.012*
PT Depression (BDI-FS)	[EDSS], Perceived Social Support	-.198	-1.489	.143
PT Depression (BDI-FS)	[EDSS], CMDI Absolute Difference Score	.446	3.496	<.01*
PT Depression (BDI-FS)	[EDSS], CMDI Mood + Evaluative Absolute Difference Score	.481	3.902	<.01*
PT Depression (BDI-FS)	[EDSS], CMDI Difference Score	.420	3.236	<.01**
PT Depression (BDI-FS)	[EDSS], CMDI Mood + Evaluative Difference Score	.461	3.729	<.01*
Perceived Social Support (SSQ – Overall)	[Age, Diagnosis Duration], CMDI Mood + Evaluative Absolute Difference Score	-.269	-1.842	.116
SO Depression (BDI-II)	CMDI Absolute Difference Score	.294	1.874	.069
Disease Severity (EDSS)	CMDI Significant Other Ratings	.153	1.071	.290

* denotes significance at $p < .05$ level

SO = significant other

PT = patient

Table 6: Paired Independent Samples T-Tests for High and Low Reported Symptom Congruence Groups

	Mean – High Congruence Group	Mean – Low Congruence Group	Significance (2-tailed)
Patient Age	52.5	52.0	.487
Diagnosis Duration	15.9	16.6	.119
Patient Education	15.0	14.3	.340
EDSS	4.25	4.62	.138
Spouse Health	1.53	1.86	.442
Spouse Age	53.3	54.6	.141
Spouse Education	16.8	15.4	.314
Patient Depression (BDI-FS)	1.5	4.535	< .01*

Appendix B

Figure 1: Patient Depression vs. Significant Other Depression

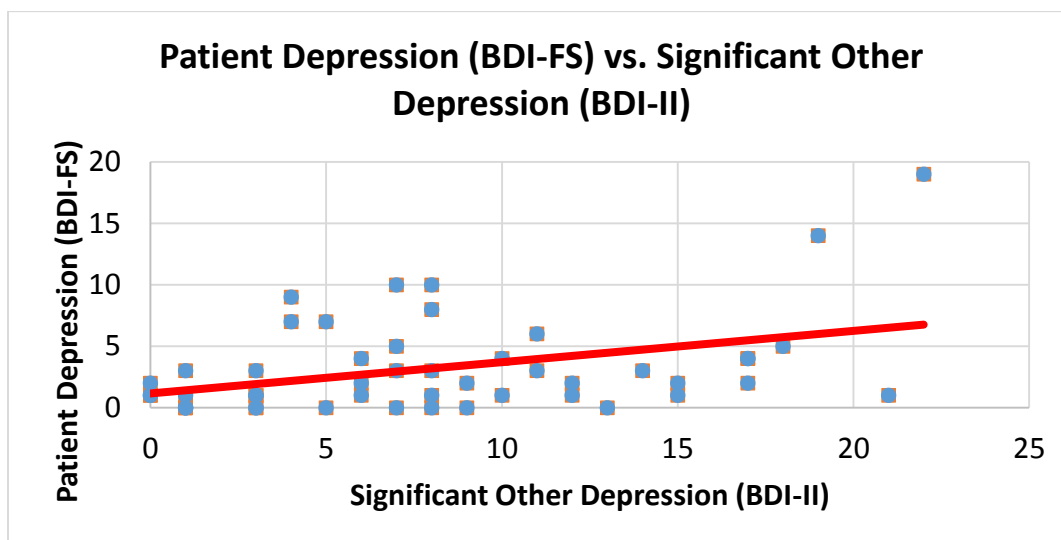


Figure 2: Patient Depression vs. Reported Symptom Congruence

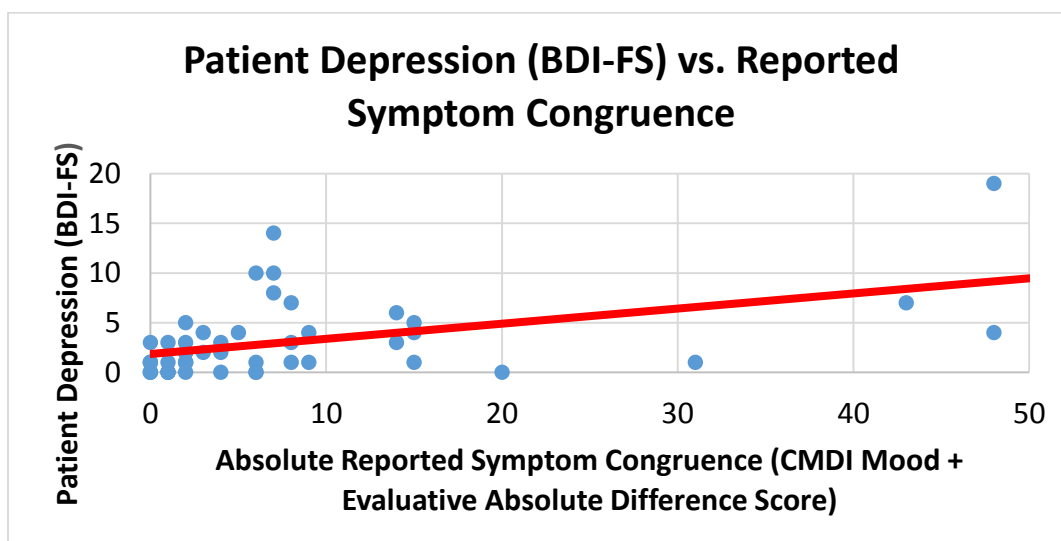
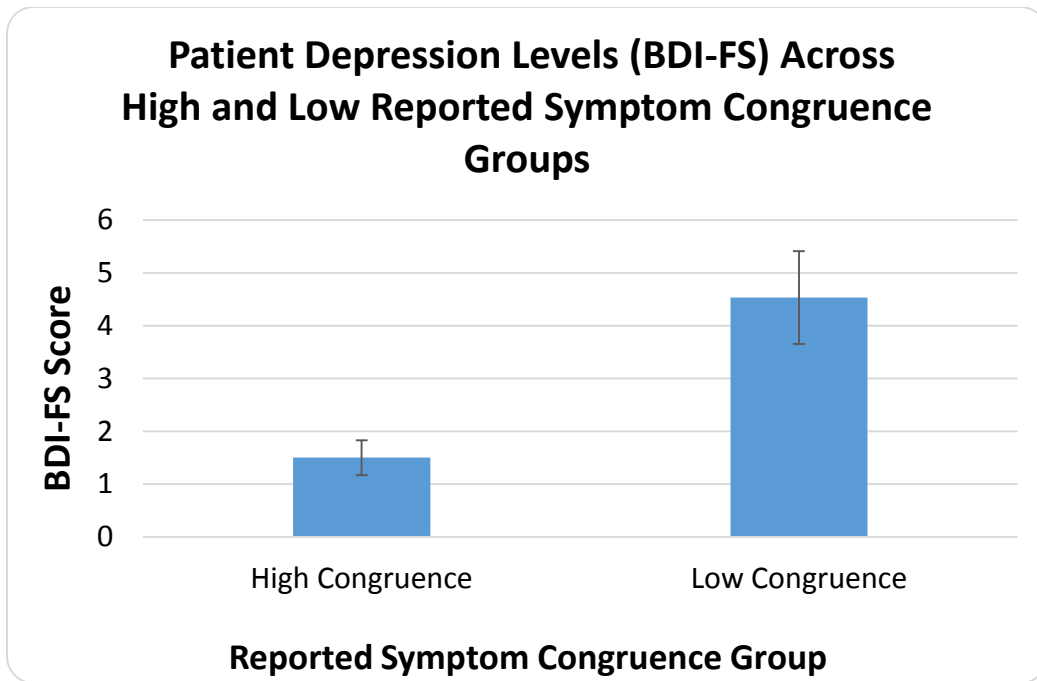


Figure 3: Patient Depression Levels Across High and Low Congruence Groups



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Honors in Psychology — Emphasis in Clinical Neuropsychology

Thesis: Depression in the MS Dyad: The Role of Depression in the Relationship Between Multiple Sclerosis Patients and Their Significant Others

Thesis Supervisor: Peter A. Arnett, PhD

Research Experience

Penn State Clinical Neuropsychology Lab University Park, 9/2013 – Present

Clinical Research Assistant

- Score neuropsychological tests, manage clinical datasets, analyze data in SPSS, code fMRI screenings
- Carry out participant phone screenings, assemble and mail questionnaire packets for subjects

Transplant Institute – Hospital of the Un. of Penn. Philadelphia, PA Summer 2013

Clinical Research Assistant

- Created and managed multiple datasets of kidney and liver transplant data in Excel
- Abstracted and scored patient lab liver biopsy data from medical databases OTTR and EPIC

Work/Volunteer Experience

Direct Support Specialist – Community Services Group State College, PA 1/2015 - Current

- Assist adults with psychiatric diagnoses in rehabilitation, goal management, and tasks for daily living
- Work closely with staff to determine best courses of patient management and care

Assistant Preschool Teacher - BCSYC Bala Cynwyd, PA Summers 2012 - 2016

- Teach, supervise, and run classroom activities with children ages 3-6 at the Bala Cynwyd School of Young Children
- Experience working with children diagnosed with Autism and ADHD

Volunteer at Belmont Behavior Health Philadelphia, PA Summer 2014

- Ran group recreational therapy sessions with pediatric psychiatric patients, aged 5-12
- In charge of running weekly ice cream social event for child, adolescent, and adult psychiatric patients
- Observed geriatric group therapy

Hershey Medical Center Career Observation Program State College, PA Spring 2014

- Shadowed a different physician each week for the duration of the semester
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Extracurricular Activities

President of Penn State AMSA Chapter (PSU AMSA) 5/2015-Present

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National Merit Scholar Fall 2012-Present

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