

Anna Finn
Lake Forest College

The Relationship between Self-efficacy and Health Promoting Behaviors, Illness Severity, Mental Health, and Perceived Quality of Life in Multiple Sclerosis Patients

Multiple sclerosis is an incurable, debilitating, nervous system disease, which causes are largely unknown, and which affects hundreds of thousands of people across the United States. Early research suggests the impact that psychological factors can have on a patient's physical and mental health status. Self-efficacy, the belief in one's ability to cope with a situation, has been found to offer beneficial and protective effects in patients suffering from conditions such as rheumatoid arthritis, sickle cell disease, and fibromyalgia. This comprehensive literature review sought to look at psychological research that has considered the relationship between self-efficacy and health promoting behaviors, symptom and overall illness severity, mental health status, and perceived quality of life in people suffering from multiple sclerosis. The literature strongly supports a relationship between self-efficacy and health promoting behaviors. The literature was ambiguous as to a relationship between self-efficacy and illness severity—with some studies finding a significant relationship and others not. The literature reviewed also suggests a potential relationship between self-efficacy and other cognitive components such as mental health status, mood control, and self-esteem. The literature supports a relationship between self-efficacy and perceived quality of life.

Multiple Sclerosis is an incurable, chronic, debilitating neurological disease that affects the central nervous system. It is caused by a destruction and subsequent reduction of myelin, which acts as a conductor of electrical impulses, facilitating the transfer of information

between nerves, and also as an insulator, protecting the nerves themselves (*About MS*). This demyelination slows the transfer of information from nerve to nerve and leaves the nerve vulnerable to inflammation and damage, as well as disrupts the smooth transfer of impulses, leading

to problems with “vision, strength, sensation, and coordination” (Shnek et al., 1997, p.187). Many of the symptoms of multiple sclerosis are in fact caused by this disruption of the flow of nerve impulses (Schapiro, 1991, as cited in Stuifbergen, Seraphine, & Roberts, 2000). These symptoms include cognitive disturbances, such as memory, attention, and problem-solving difficulties, walking difficulties (*About MS*), weakness, numbness, fatigue, visual disturbances, dizziness, problems maintaining one’s balance, loss of coordination, bladder and bowel problems, changes in sexual functioning, pain, and spasticity.

About 400,000 individuals are currently diagnosed with MS in the United States, and there are about 10,000 newly diagnosed cases each year (Fraser, Hadjimichael, & Vollmer, 2001). Worldwide, it is estimated that 2.5 million individuals have the disease (*About MS*). MS is twice more prevalent in women than in men, and is most common in whites, especially people with a Northern European background (*About MS*). The general age of onset is between the ages of 20 and 40 (Barnwell & Kavanagh, 1997).

There are two categories of MS: relapsing-remitting MS and progressive MS. The relapsing-remitting type, the most common form, is characterized by almost complete recovery between exacerbations. However, exacerbations often get progressively worse and can involve intense neurological dysfunction (Barnwell & Kavanagh, 1997). Progressive forms of MS, which are much less common, include primary progressive MS, progressive-relapsing MS, and secondary progressive MS. These forms of MS involve a much more apparent steady reduction in one’s functional ability (Barnwell & Kavanagh, 1997).

A still not well understood disease, the causes of MS remain largely unknown. Scientists point to several possible factors, including a genetic predisposition and environmental triggers such as certain viruses, traumas, and heavy metals that likely contribute to the development of MS, though the strength of each contribution

is not known (*About MS*). The average person has a 1 in 750 chance of developing MS, while someone who has a parent with the disease has a 1 in 40 chance (*About MS*). Furthermore, twin studies have found that identical twins have a 1 in 3 chance of developing MS if their co-twin has the disease. While this clearly points to a genetic component, it also suggests that environmental factors make a difference. Otherwise, the chance would be much greater than 1 in 3 for two individuals with the same genetic make up (*About MS*). More than likely, there is an interaction effect, whereby one’s genetic background makes an individual especially vulnerable to developing the disease, but whether or not the person actually develops the disease is dependent largely on environmental factors.

A generally erratic, but progressively worsening illness, consisting either of alternating periods of stability and exacerbations or steady decline, multiple sclerosis takes a great toll on patients’ mental health (Wingerson & Wineman, 2000). Because of the day-to-day uncertainty the illness brings, and the fear of eventual physical incapacitation, many MS patients are also diagnosed with psychological illnesses, including most commonly depression (Shnek et al., 1997). MS patients also have increased rates of emotional distress and are at increased risk for suicide (Wingerson & Wineman, 2000). With no cure likely to be found in the near future, medical treatments are still in their very beginning stages and focus mainly around reducing the severity of the symptoms and slowing the progression of the disease. With treatments for MS only available since 1993, researchers have begun to explore psychological aspects of MS to determine whether attitudinal factors may affect the course of the disease, the severity of symptoms, and the mental health of MS patients (Fraser et al., 2001).

Bandura’s social cognitive theory stresses the importance of self-efficacy, an individual’s confidence that he or she can perform a certain behavior or cope with a given situation, as a predictor of future performance. Bandura found that self-efficacy was a significant predictor of

not only successful performance, but also of amount of effort exerted and persistency in performance despite the presence of obstacles (Wassem, 1992). Thus, the psychological impact of self-efficacy is profound; high self-efficacy is often associated with positive outcome expectations and increased effort and persistence, and low self-efficacy, with poor outcome expectations and reduced effort (Wassem, 1992). This theory, which has been repeatedly supported by scientific findings, suggests that the strength of self-efficacy as a predictor is not limited to immediate effects, but that self-efficacy can also predict long-term outcome variables (Barnwell & Kavanagh, 1997). Thus, recent research on self-efficacy has largely centered on exploring the strength of self-efficacy as a predictor of long-term health promoting behaviors and other important outcome variables (Barnwell & Kavanagh, 1997).

Self-efficacy, the belief that one has the ability to cope with a situation, has been found to have significant positive effects on coping, quality of life, and overall mental health (Riazi, Thompson, & Hobart, 2004). Research on other illnesses, specifically rheumatoid arthritis (Brekke, Hjortdahl, & Kvien, 2001, as cited in Riazi et al., 2004), sickle cell disease (Edwards, Telfair, Cecil, & Lenoci, 2001, as cited in Riazi et al., 2004), and fibromyalgia (Buckelew et al., 1996, as cited in Riazi et al., 2004), has found that improving self-efficacy has had positive effects on self-reported health status. Studies have also found a significant relationship between self-efficacy and other behavioral factors, such as assisting an individual's adjustment to the symptoms of their illness, improving adherence to one's medical regimen, quitting smoking (Borrelli et al., 2002, as cited in Riazi et al., 2004), reducing one's weight (McCann, Bovbjerg, Brief, & Turner, 1995, as cited in Riazi et al., 2004), and increasing one's adherence to exercise programs (Pender, Bar-Or, Wilk, & Mitchell, 2002, as cited in Riazi et al., 2004) in individuals with diabetes, alcoholism, depression, cardiac disorders (Wassem, 1992), weight disorders (Fraser et al., 2001) and a host of other

disorders (Barnwell & Kavanagh, 1997). Therefore, the goal of this paper is to review research that looks at the relationship between self-efficacy and health promoting behaviors, such as adherence to medical regimen and physical activity; symptom and overall illness severity; mental health status; and perceived quality of life in patients with multiple sclerosis.

Review of the Literature

The literature reviewed was found using Medline and PsycInfo. This literature review is organized methodologically. The methodological approaches of the 11 journal articles reviewed include two types of designs. One approach is correlational, and there are several types of correlational studies reviewed, including four cross-sectional studies, four longitudinal studies, and two retrospective studies. A second method is quasi-experimental, and one of the studies reviewed had a quasi-experimental design.

Correlational Studies

Ten correlational studies were reviewed. While different measures of self-efficacy were used in many of these studies, all data was obtained through the use of questionnaires.

Cross-sectional Studies

Four cross-sectional correlational studies assessed both self-efficacy and a number of outcome variables of interest, which varied among the studies. All of the variables were assessed through the use of questionnaires that were completed at a single point in time. Vercoulen et al. (1998) looked at the relationship between self-efficacy and fatigue, as well as other symptoms often comorbid with fatigue syndrome, in 50 Multiple Sclerosis patients. A diagnosis of MS was confirmed through a full physical and neurological examination conducted prior to the onset of the study. Information about self-efficacy was obtained through a single 5-point scale question, as well as through selected items from the Pain Cognition List believed to measure self-efficacy. Fatigue was

measured using the subjective fatigue subscale of the Checklist of Individual Strength. Other outcome measures included depression, which was assessed using the Beck Depression Inventory, functional impairment, which was determined by the Sickness Impact Profile (SIP), focus on bodily symptoms, which was measured through the somatization subscale of the Symptom Checklist, and level of physical activity, which was assessed through the subscale of mobility on the SIP and through the Physical Activities Rating Scale. Vercoulen et al. (1998) found, through structural equation modeling, a significant negative relationship between self-efficacy and fatigue. A significant positive association was also found between self-efficacy and level of physical activity. No significant relationship was found between self-efficacy and any of the other outcome variables.

Stuifbergen et al. (2000) studied the relationship between self-efficacy and health promoting behaviors, central to one's quality of life, through questionnaires distributed to 786 subjects with MS. A diagnosis of MS was assumed, on the basis that the sample was drawn from individuals, on the mailing list of the National MS Society chapters, who indicated a diagnosis of multiple sclerosis. Self-efficacy was assessed through the Self-Rated Abilities for Health Practices scale. Outcome variables examined in the study were chosen during a preliminary phase of the study, when researchers tried to identify key variables and antecedents highly related to health promoting behaviors and perceived quality of life in MS patients. Severity of illness was assessed using the Incapacity Status Scale, barriers were assessed using the Barriers to Health Promoting Activities for Disabled Persons Scale, resources were measured through the Personal Resource Questionnaire, acceptance was assessed using the Acceptance of Illness Scale, health-promoting behaviors were measured through the Health Promoting Lifestyle Profile-II, and quality of life was measured by the Quality of Life Index. Stuifbergen et al. (2000) found a statistically significant negative relationship between self-

efficacy and severity of illness. A significant negative relationship was also found between self-efficacy and barriers. A significant positive association was found between self-efficacy and resources, acceptance of illness, health-promoting behaviors, and quality of life. All the above mentioned relationships were assessed using a significance level of .01.

Wassem (1992) looked at the strength of self-efficacy as a predictor of adjustment to disease in a convenience sample of 62 MS subjects. A diagnosis of multiple sclerosis was determined based on demographic questionnaires, completed at clinic appointments and support group meetings of the National MS Society, which included questions about an MS diagnosis. Self-efficacy was measured using the Self-Efficacy for Adjustment Behaviors Scale, which focused on three subscales of adjustment including psychosocial adjustment, self care adjustment, and disease management adjustment. Outcome variables included attitudes and behaviors associated with one's adjustment to his or her disability, which was assessed using the integration subscale of the Bell Disability Scale of Adjustment, and level of disability, which was measured using the Modified Disability Status Scale. Wassem (1992) found self-efficacy to be a significant predictor of adjustment, accounting for 24% of the variance in adjustment. Most of this variance was accounted for by the psychosocial subscale of the Self-Efficacy for Adjustment Behaviors Scale. Demographic variables, self-efficacy, and outcome expectations, combined, accounted for over half of the variance in adjustment. Self-efficacy was not found to be a significant predictor of severity of illness.

Shnek et al. (1997) considered the strength of self-efficacy as a predictor of depression in 80 MS patients. A diagnosis of multiple sclerosis was confirmed based on the diagnostic criteria established by Pose et al. (1983), through a Medical Information Questionnaire, and also through medical records. Questionnaires were used to gather data on predictive and outcome variables. Self-efficacy was measured using the Beliefs Scale, a modified version of the Arthritis

Beliefs Scale. Depression was assessed through the Center for Epidemiologic Studies Depression Scale. Other variables included level of disability, which was assessed using the Ambulation and Body Care and Movement Items Scale of the Sickness Impact Profile; learned helplessness, which was measured using the Attitudes Index; cognitive distortions, which was assessed through the Cognitive Beliefs Questionnaire; and other demographic and medical information, including status of employment, number of medications, and psychiatric disability which were established using the Medical Information Questionnaire. Shnek et al. (1997) found self-efficacy to be a significant predictor of depression. Moreover, significant negative relationships were identified between self-efficacy and cognitive distortions, and between self-efficacy and helplessness. There was no significant relationship between self-efficacy and employment, number of medications, psychiatric history, or disability.

All of the cross-sectional correlational studies reviewed found a significant relationship between self-efficacy and at least one of the outcome variables of interest. Significant positive correlations were found between self-efficacy and a number of outcome variables (e.g. physical activity, personal resources, acceptance of illness, health promoting behaviors, quality of life, and adjustment). Significant negative correlations were found between self-efficacy and a number of outcome variables (e.g. fatigue, barriers to health promoting activities, cognitive distortions, and helplessness). Ambiguous findings were reported as to a relationship between self-efficacy and severity of illness, and self-efficacy and depression.

Longitudinal Studies

Four of the studies were longitudinal correlational studies, and assessed both self-efficacy and the outcome variables of interest, which vary among studies, through the use of questionnaires completed at two or more points in time. The follow-up time between the completion of pre- and post-measures ranged

from six weeks to six months.

Barnwell & Kavanagh (1997) were interested in the possible relationship between self-efficacy and psychological adjustment in multiple sclerosis patients. They looked at two aspects of self-efficacy; specifically, self-efficacy for social activity and self-efficacy for mood control. Seventy-one MS patients were initially assessed through questionnaires, if they had been obtained through a mailing list, or through an interview, if they had been found as subjects attending MS centers at the time of the study. Assessment at the two month follow-up was conducted via questionnaires. Self-efficacy for mood control was measured through the Self-Efficacy Questionnaire for Mood Control, and self-efficacy for social activity was assessed using the Self-Efficacy for Social Activity Questionnaire. Outcome measures for social activity and mood control were determined by looking at self-reported performance, also assessed through questionnaires. The outcome questionnaires consisted of lists of activities or events considered to be representative of social activity (P-Social) and mood control (P-Mood), and subjects were asked to place tick marks next to the activities or events they had participated in over the two month period. Other outcome measures included depression, assessed through the Beck Depression Inventory; self-esteem, measured using the Coopersmith Self-esteem Inventory; and severity of illness, determined by the physical dimension score of the Sickness Impact Profile. Barnwell & Kavanagh (1997) found self-efficacy for mood control to be a significant predictor of mood control and social activity, such that greater levels of self-efficacy were predictive of greater levels of mood control and higher amounts of social activity. Self-efficacy for social activity was a significant predictor of mood control and social activity, that is greater levels of social activity self-efficacy at the baseline were associated with greater levels of mood control and social activity at the two month follow-up. Both types of self-efficacy were significant predictors of depression; high levels of self-efficacy were related to low levels

of depression at the two month follow-up. Both types of self-efficacy were also significant predictors of self-esteem, such that greater levels of baseline self-efficacy were indicative of greater levels of self-esteem at follow-up. Lastly, both types of self-efficacy were significant predictors of severity of illness at the follow-up, such that greater levels of baseline self-efficacy were indicative of lower levels of severity of illness at the follow-up.

Riazi et al. (2004) studied the relationship between self-efficacy and self-reported health status in 89 MS patients admitted to the National Hospital for Neurology and Neurosurgery for either rehabilitation treatment or intravenous steroid treatment. Baseline levels of self-efficacy were obtained upon hospital admission and at discharge for patients involved in rehabilitation treatment, or six weeks later for patients involved in intravenous steroid treatment. A diagnosis of multiple sclerosis was assumed due to the admittance of the patients to the hospital for MS related treatment. Self-efficacy was assessed using the Multiple Sclerosis Self-Efficacy Scale, which includes two subscales that look specifically at functional ability and at confidence in functional abilities. The physical as well as the psychological impact of MS on a person, one's MS health status, was determined by the MS Impact Scale (MSIS-29). Walking, generally reflective of overall symptom severity, was measured using the Multiple Sclerosis Walking Scale. The inpatient rehabilitation treatment, which is highly individualized, is generally geared towards teaching problem-solving skills, promoting goal-oriented decision-making, and providing patients with overall techniques aimed at reducing the toll MS takes on daily living. Steroid treatment through the use of corticosteroids is used during MS relapses as a means of controlling the symptoms associated with an exacerbation and to prevent the relapse from getting progressively worse.

Patients in the steroid group received 1g of methylprednisolone every day for three consecutive days. Baseline measures revealed that patients who were part of the inpatient rehabilita-

tion program were significantly more disabled than patients involved in the intravenous steroid treatment group. Riazi et al. (2004) found that, in both groups, greater self-efficacy scores were associated with better health status at both baseline and follow-up. It was also found that better initial functional self-efficacy scores and improvement in functional self-efficacy scores were significantly related to improvement on all outcome measures in both treatment groups. In the rehabilitation group, improvement in the control subscale of self-efficacy was a significant predictor of improvement in health status scores, as determined by the MSIS-29. In the steroid group, baseline functional self-efficacy scores were significant predictors of health status scores, as determined by the MSIS-29. Furthermore, baseline self-efficacy control scores and changes in functional self-efficacy and control self-efficacy were significant predictors of all outcome measures.

In a sample of 101 patients with relapsing-remitting multiple sclerosis, Mohr, Boudewyn, Likosky, Levine, & Goodkin (2001) studied the relationship between self-efficacy and adherence to Interferon beta-1a medication, a drug treatment that must be injected weekly, and that is aimed at slowing the progression of multiple sclerosis and reducing the number and intensity of exacerbations. Patients were selected from those MS patients approved to begin this type of drug therapy, and were excluded if they had had prior experience with self-injection, since researchers were partly interested in whether high injection anxiety would lead to lower adherence. Patients' self-efficacy, injection anxiety, and adherence expectations were assessed through questionnaires read to participants during telephone interviews two weeks prior to the start of treatment, two weeks after the onset of treatment, and at an eight week follow-up. Self-efficacy was assessed using the Injection Self-Efficacy Expectations Scale. Other variables included injection anxiety, which was measured through the Injection Anxiety Expectations Scale; adherence expectations, which were determined through the Adherence

Expectation Rating Scale; and illness severity, which was assessed through the Guy's Neurological Disability Scale. Adherence was measured at the six month follow-up through patient self-report and through confirmation from the KPMC pharmacy that the patient was or was not having their prescription refilled.

Mohr et al. (2001) found a significant negative association between pre-treatment self-efficacy and pre-treatment anxiety. Injection self-efficacy determined at the eight-week follow-up was significantly related to post-treatment experienced injection anxiety, such that the greater one's self-efficacy about the ability to self-inject, the less self injection anxiety experienced. Injection self-efficacy was found to be significantly related to Interferon beta-1a adherence at six months; however, this relationship was found to be fully mediated by the identity of the injection administrator (i.e. the patient, the spouse, the health provider, etc.) Thus, the relationship that exists between self-efficacy and adherence is not sufficient by itself, but rather is completely dependent on the injection administrator.

Fraser, Morgante, Hadjimichael, & Vollmer (2004) looked at self-efficacy as a possible predictor of adherence to Glatiramer Acetate (Copaxone) intravenous medication in a convenience sample of 108 MS patients who had already initiated therapy with Copaxone. Self-efficacy and other psychological variables were assessed prior to beginning drug therapy, and adherence was assessed at a six month follow-up. Self-efficacy was measured using the Multiple Sclerosis Self-Efficacy Scale (MSSE). Adherence was defined, by self-report, as continuing therapy with Copaxone subcutaneously, daily for at least six months. Fraser et al. (2004) found self-efficacy to be a significant predictor of adherence to Copaxone therapy, and the adherent group had significantly higher self-efficacy scores than the non-adherent group. Initial self-efficacy scores accurately predicted adherence to Copaxone therapy at the six month follow-up for 98.8% of those in the adherent group.

Of the longitudinal correlational studies reviewed, all four found a significant relationship between self-efficacy and at least one of the outcome variables of interest. Significant positive correlations were found between self-efficacy and a number of desirable outcome variables (e.g., mood control, social activity, self-esteem, health status, and adherence). Significant negative correlations were found between self-efficacy and a number of adverse outcome variables (e.g., depression, severity of illness, and pre-treatment anxiety).

Retrospective Studies

Two of the studies reviewed were retrospective correlational studies. In both of these studies, self-efficacy was assessed using the Multiple Sclerosis Self-Efficacy Scale (MSSE) in the present, and subjects were asked to reconstruct levels of adherence over the past year. Fraser et al. (2001) were interested in the relationship between self-efficacy and adherence to Copaxone therapy in 341 patients with relapsing-remitting MS. Subjects included those who had been adherent to Copaxone therapy for at least the prior year (n=225), and those non-adherent to Copaxone therapy during the prior year (n=116). Researchers believed that self-efficacy scores taken at the time of the study would be able to correctly classify individuals as to whether they had been adherent to Copaxone therapy during the prior year. Adherence was defined as continuing therapy with Copaxone daily for at least one year. Fraser et al. (2001) found the control subscale of the self-efficacy measure to be a significant predictor of adherence. The higher one's score on the control subscale of the MSSE, the more likely that individual was to have adhered. The adherent group had significantly greater self-efficacy that they could control their MS. Functional self-efficacy, one's confidence in his or her ability to function despite MS, was not a significant predictor of adherence.

Fraser, Hadjimichael, & Vollmer (2003) studied the strength of self-efficacy as a predictor of adherence to Copaxone therapy in 199 subjects with progressive MS. Subjects included

those who had been adherent and had taken Copaxone for at least one year (n=107), and those non-adherent who had discontinued therapy before the end of the year (n=92). Therefore, researchers were interested in whether self-efficacy measures, obtained at the time of the study, could properly classify individuals as to whether they had adhered or not adhered to Copaxone therapy during the prior year. Fraser et al. (2003) found both subscales of self-efficacy, the control subscale and the function subscale, to be significant predictors of adherence. The greater one's score on the MSSE, the more likely that individual was to have adhered. Both retrospective correlational studies reviewed found a significant positive relationship between self-efficacy and adherence to Copaxone therapy.

Quasi-experimental Studies

One of the studies was a within-subjects (pre-post) quasi-experimental study. In this study, random assignment was not used, and thus, the study must be considered a quasi-experimental study, since true experimental designs require random assignment. The fact that all subjects were assigned to the intervention makes this study a within-subjects design. Wingerson & Wineman (2000) considered the relationship between self-efficacy and overall mental health during a community-based treatment involving a convenience sample of 12 subjects with MS who indicated a need for counseling. All subjects participated in the short-term counseling intervention, which consisted of individualized therapy based on the person's particular needs. Self-efficacy was measured prior to the beginning of the intervention and at the conclusion of the intervention, using a modified version of the Self-Efficacy Instrument. The outcome variable mental health was assessed through the Mental Health Inventory. All measures were assessed at pre-treatment and at post-treatment, and pre-treatment measures were used to formulate individual treatment plans. Wingerson & Wineman (2000) found a significant improvement in self-efficacy when comparing pre and post self-efficacy

scores. However, there was no significant improvement in mental health as a result of treatment. Hence, the only quasi-experimental study reviewed found no relationship between self-efficacy and mental health.

Discussion

Summary of Findings

Of the 11 studies reviewed, almost all report a statistically significant relationship between self-efficacy and at least one of the outcome variables tested. However, there is still some disparity over which variables can be significantly predicted by self-efficacy, because while some studies report a significant relationship with a specific outcome variable, other studies fail to detect this relationship. All six studies that looked at the relationship between self-efficacy and health promoting behaviors such as level of physical activity, level of social activity, and adherence to medical regimens, and related feelings about health promoting behaviors (such as perceived barriers to health promoting behaviors and belief in availability of resources), found significant relationships. While most of these studies looked at the health promoting variable of adherence to MS medication, and relatively few considered other health promoting behaviors, all four studies that considered adherence found a statistically significant relationship between self-efficacy and treatment adherence. Furthermore, adherence was assessed in these studies over a relatively long period of time, ranging from six months to one year, lending them fairly good credibility. Generally, the longer the follow-up period, the greater the strength of the findings. Studies that have longer follow-up periods are more likely to detect true effects as opposed to chance findings or short-lived relationships that may be present immediately following an intervention. Because of this, studies that use longer follow-ups are generally accepted as methodologically stronger than those studies that have relatively short follow-ups. These findings suggest that it may be beneficial for treatment centers to consider a person's self-efficacy before starting him or her on intrave-

nous MS medications, because people with low self-efficacy may not benefit from this treatment without further intervention to improve their level of self-efficacy. The remaining studies, focusing on the relationship between self-efficacy and health promoting behaviors, considered different outcome variables, and thus were unable to replicate findings and establish proof of a real relationship. However, because all relationships considered between self-efficacy and health promoting behaviors were found to be significant, it is likely that self-efficacy is related to health promoting behaviors, and that self-efficacy may serve as a predictor of adherence, level of physical activity, and other health promoting activities.

Of the six studies that considered the relationship between self-efficacy and physical symptom severity, functional impairment, fatigue, health status, and overall illness severity, three found significant relationships, two did not find a statistically significant relationship, and one had somewhat inconsistent results, finding a significant relationship between one of the health-related variables and self-efficacy, but failing to find a significant relationship between self-efficacy and the other health-related variable. Ultimately, most of the discrepancy had to do with the relationship between self-efficacy and illness severity, with two studies finding a significant relationship and one not. While clearly the association between self-efficacy and health status is questionable based on this review, these results may be attributable to the way in which health status was measured. For example, studies that provided purely physical assessments of health status, such as functional impairment or extent of disability—excluding more subjective symptoms such as fatigue—generally did not find a statistically significant relationship with self-efficacy. However, studies that employed a more subjective measure of disability (e.g., perceived illness severity or perceived health status) often did find a significant relationship with self-efficacy. This suggests that self-efficacy may influence people's subjective assessments of their overall health

status, and that those with greater self-efficacy may downplay the negative aspects of their illness and exercise the sense of control they believe they have over its severity. However, when these same subjects are asked to objectively report the severity of specific physical symptoms of their disease, such as the extent of their disability or the actual impairment they face, self-efficacy may not be related to their actual physical state. In other words, perceived self-efficacy may be significantly related to variables such as perceived severity of illness because having self-efficacy allows people to look past the specific physical problems they may encounter and still maintain a positive sense of control over the extent of their disability. At the same time, self-efficacy may not be related to symptom severity or severity of impairment because, while self-efficacy may give people a more positive attitude, it does not allow them to overlook specific physical shortcomings. This is not surprising, given the fact that self-efficacy is fundamentally defined in terms of self-perception. Thus, outcome variables which depend, in large part, on perception may be more strongly related to self-efficacy than more objective variables.

Out of four studies that looked at the relationship between self-efficacy and psychological outcomes, including mental health status, feelings of helplessness, cognitive distortions, depression, mood control, and self-esteem, half found a significant relationship and half did not. Most of the inconsistency had to do with the relationship between self-efficacy and depression; two studies found a significant relationship and one did not. Due to this inconsistency, further research must be done before a relationship can be established between self-efficacy and depression. However, studies that focused on the relationship between self-efficacy and other psychological components did find a significant relationship with cognitive distortions, feelings of helplessness, mood control, and self-esteem, suggesting that self-efficacy may be associated with other cognitive components. It is reasonable to assume that self-efficacy, defined as the

belief of control one feels over one's MS, may impact other cognitive aspects such as feelings of helplessness and self-esteem, because these psychological components are also largely affected by self-perception. People with greater self-efficacy, who feel strength in their ability to control their MS and their future, likely perceive themselves in a better light and probably have fewer feelings of helplessness and greater self-esteem than individuals with low self-efficacy. However, because these relationships were not repeatedly tested and their findings replicated, one cannot be certain as to whether a true relationship exists.

Lastly, of the two studies that looked at perceived quality of life, including acceptance of illness and overall adjustment to illness, both found statistically significant relationships. Clearly, it is conceivable that individuals with greater self-efficacy would report a greater perceived quality of life and likely consider themselves to be more adjusted and more accepting of their illness than those with low self-efficacy. However, one must hesitate before drawing this conclusion based on the limited amount of research that has been done in this area. Further research is necessary before a relationship between self-efficacy and perceived quality of life can be deemed credible, and replication is vital before a relationship between self-efficacy and the above mentioned variables can be confirmed.

Strengths of the Literature Reviewed

There are several strengths to the literature reviewed in this paper. Almost all of the correlational studies had moderate to large sample sizes. Furthermore, of these studies, those that performed an analysis of the demographic characteristics of their sample found their sample to be a fairly accurate representation of the MS population-samples were largely made up of white, middle-age women. Having a moderate to large sample size increases the likelihood of also having a representative sample, and a representative sample allows one to generalize findings to the greater population

with more confidence.

Another strength of the literature reviewed in this paper is that, methodologically, many of the variables of interest were assessed using instruments demonstrated to be internally consistent. For example, four of the studies used the Multiple Sclerosis Self-Efficacy Scale (MSSE) as a measure of self-efficacy, a scale developed specifically to measure self-efficacy in MS patients, with a recognized overall alpha of around .89 (Schwartz, Coulthard-Morris, Zeng, & Retzlaff, 1996, as cited in Fraser et al., 2003). Shnek et al. (1997) also report an alpha of .89 for the Beliefs Scale, used to assess self-efficacy in their study. Wassem (1992) reports Cronbach's alpha for the Self-Efficacy for Adjustment Behaviors Scale to be .91. Barnwell & Kavanagh (1997) report the internal consistency of the two subscales of their self-efficacy measures, self-efficacy for mood control and self-efficacy for social activity, to be .91 and .90, respectively. Furthermore, in all but two of the studies reviewed, researchers report the self-efficacy scale used to have been previously proven valid and reliable. In Wingerson & Wineman (2000) test-retest reliability for the Self-Efficacy Instrument is reported to be between .82 and .89, and construct validity between .14 to .68. It is important that the instruments used are internally consistent, as well as valid and reliable, because if they are not, then one cannot be completely confident in the findings, even if they are statistically significant.

Weaknesses of the Literature Reviewed

Unfortunately, there are many shortcomings to the literature reviewed. Methodologically, there were no true experiments conducted to test the relationship between self-efficacy and any of the outcome variables of interest. This means that a cause and effect relationship cannot be established. Furthermore, there was only one quasi-experimental study, and that study was quite weak, with an extremely small sample size and no control group. While quasi-experimental studies are inherently weak due to their lack of random assignment, often this weakness can be

offset, at least in part, by the presence of a control group, which can be compared to the experimental group in order to determine whether a cause and effect relationship is likely. However, the quasi-experimental study reviewed did not have a control group, which means that one cannot be certain that the findings were a result of a change in self-efficacy and indicative of a true cause-and-effect relationship, or whether the results were attributable to some specific factor associated with the treatment. In order to eliminate this possibility, one must always include a control group.

The lack of experimental studies also makes it difficult to identify a cause-and-effect relationship because confounds cannot be controlled. For example, one health promoting behavior tends to be associated with other health promoting behaviors. That is, an individual who partakes in a health promoting behavior (e.g., exercising), is likely to also partake in other, related health promoting behaviors (e.g., healthy diet or not smoking). Because of this, it is almost impossible to determine, based strictly on a significant correlational relationship, whether a finding is indicative of a cause-and-effect relationship, a by-product of an outcome variable, or a result of other related outcome variables. In other words, if a statistically significant relationship was detected between self-efficacy and exercising, this finding may be reflective of a true cause-and-effect relationship, whereby one of the variables causes changes in the other variable. However, it may also be the case that the finding is attributable to a relationship between self-efficacy and a by-product of exercise (e.g., increased self-esteem).

Because all but one of the studies reviewed were correlational in nature, it is impossible to determine with certainty whether a true relationship exists, or whether the observed association is a result of each variables' relationship with a third variable. For example, in terms of the presumed relationship between self-efficacy and health promoting behaviors, it could be that the relationship between self-efficacy and health promoting behaviors is determined by a

third variable, such as illness severity, or by another psychological component such as optimism. If self-efficacy and illness severity are highly correlated, and illness severity and health promoting behaviors are highly correlated, then, while it may appear statistically that self-efficacy and health promoting behaviors are highly correlated, this may not be indicative of an underlying cause-and-effect relationship at all. Instead, illness severity may be affecting both self-efficacy and health promoting behaviors—with greater illness severity resulting in lower levels of self-efficacy and lower levels of health promoting behaviors. Thus, each variable's relationship to illness severity might create the appearance of a cause-and-effect relationship, when in reality no such relationship exists.

Another problem with this heavy reliance on correlational studies, especially cross-sectional studies, is that they cannot determine with confidence the direction of a relationship. For example, in considering the findings of Vercoulen et al. (1998), one can speculate that higher self-efficacy causes people to partake in greater amounts of physical activity. However, it could be the case that partaking in greater amounts of physical activity causes people to have greater strength in their belief that they can control their MS. When data are obtained at only one point in time, as they are with cross-sectional studies, it is almost impossible to determine directionality with a high degree of confidence.

Another weakness is that none of the studies reviewed were prospective studies. This means that the effects of self-efficacy on MS can only be looked at after the disease has manifested itself and a diagnosis has been made. Whether a higher or lower level of self-efficacy has an effect on the onset of MS, or on factors that lead to the development of multiple sclerosis cannot be determined.

Only three of the correlational studies reviewed included follow-ups, and the follow-up periods were relatively short, ranging from two to six months. Clearly, longitudinal studies are methodologically stronger than cross-sectional

and retrospective studies, because there is a greater likelihood that true effects will be detected, as opposed to temporary effects or chance findings. When trying to determine whether self-efficacy has an effect on the physical symptoms of MS, longitudinal studies are much preferred. If the effects of self-efficacy were present only for a short time period following a treatment, cross-sectional studies or longitudinal studies, where the follow-up time is minimal, would misinterpret the effects of self-efficacy as long-lasting, when in fact they may be temporary. Further, if the effects of self-efficacy were delayed, even longitudinal studies may not detect this relationship if the follow-up periods are short. Especially in terms of physical symptomatology, whether findings are considered significant is determined largely by the degrees of protective effects offered and the lengths of time that the protective effects last. Thus, in order for self-efficacy to be viewed as a valuable tool for reducing the impact of symptoms or lessening overall illness severity, the long-term effects of self-efficacy would have to be demonstrated. In order to accomplish this, it would be necessary to follow a group of MS patients for several years, in order to see whether levels of self-efficacy could predict exacerbations of MS.

Suggestions for Future Research

Taking into consideration the several strengths and the numerous flaws of the reviewed literature, an ideal study looking at the relationship between self-efficacy and health promoting behaviors, physical symptoms and illness severity, mental health, and quality of life would include an experimental design with a long-term follow-up. Ideally, one might want to use a prospective design. However, because so little is known about the cause of MS, many resources may be wasted using this design on large groups of individuals who might never develop MS. A more productive study would consist of an experimental between-subjects design, that includes a large group (n=500) of MS patients. Pre-test measures would be obtained through the use of questionnaires on self-

efficacy, health promoting behaviors, mental health, physical symptomatology, and perceived quality of life, and then patients would be randomly assigned to either a treatment condition or a control condition. If a large sample could not be obtained, then surely subjects would need to be matched on important disease characteristics, such as extent of disability. The treatment condition would involve self-efficacy training, and following the intervention, post-test measures would be obtained. While multi-modal treatments that involve stress management training or teaching coping skills may be considered more effective overall, using this type of treatment approach to address the question at hand would not be desirable. Using a multi-modal treatment approach, where the treatment is multi-faceted, causes later ambiguity because it is difficult to distinguish between and determine the effectiveness of different components of the treatment, as it is also difficult to determine whether the observed results were the result of an interaction between some of the treatments and not others. Thus, multi-modal treatments complicate matters when trying to establish a causal relationship and identify a relationship between self-efficacy and the variables in question. Furthermore, including a long-term follow-up, perhaps testing subjects on all measures every six months for ten years, would provide a much more accurate picture of the relationship between self-efficacy and outcome variables such as health promoting behaviors, symptom and overall illness severity, mental health status, and perceived quality of life in MS patients, and also provide a better understanding about the strength of these relationships. Also, using a long-term follow-up would allow for a better look into the possible relationship between self-efficacy and symptom severity, because it is likely that subjects would experience exacerbations during a longer time period, and self-efficacy could be assessed in relation to these symptomatic relapses.