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Self-Efficacy as a Predictor of Self-Reported Physical, Cognitive and Social Functioning in Multiple Sclerosis

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Abstract

Objective—Investigate whether self-efficacy is associated with physical, cognitive and social functioning in individuals with Multiple Sclerosis (MS) when controlling for disease-related characteristics and depressive symptomatology.

Participants—81 individuals between the ages of 29 and 67 with a diagnosis of clinically definite MS.

Method—Hierarchical regression analysis was employed to examine the relationships between self-efficacy and self-reported physical, cognitive, and social functioning.

Results—Self-efficacy is a significant predictor of self-reported physical, cognitive and social functioning in MS after controlling for variance due to disease related factors and depressive symptomatology.

Conclusions—Self-efficacy plays a significant role in individual adjustment to MS across multiple areas of functional outcome, beyond that which is accounted for by disease related variables and symptoms of depression.

Keywords

self-efficacy; Multiple Sclerosis; functional outcomes

Introduction

Published estimates indicate that 2.5 million individuals currently have Multiple Sclerosis (MS) with 400,000 of these individuals living in the United States (National Multiple Sclerosis Society, 2005). MS is an autoimmune disorder which results in sclerotic plaques forming in the myelin sheath in the central nervous system, as well as axonal damage. MS

can present with a variety of combinations of symptoms such as motor, cognitive, and neuropsychiatric disruptions (Chiaravalloti & DeLuca, 2008; Frohman, Racke & Raine, 2006). These symptoms can result in functional limitations and are significant predictors of unemployment, lower standard of living, and withdrawal from social and leisure activities in persons with MS (Jongen, Ter Horst, & Brands, 2012; Pompeii, Moon, & McCrory, 2005; Rao, Leo, Bernardin, & Unverzagt, 1991).

The interaction and co-occurrence of these various symptoms and disabilities in MS (Physical, cognitive and neuropsychiatric) can decrease psychosocial adjustment to life with MS and cause changes in values and beliefs, as well as how the individual views him or herself (Benito-León, Morales & Rivera-Navarro, 2002; Irvine, Davidson, Hoy, & Lowe-Strong, 2009; Garfield & Lincoln, 2012). Psychosocial adjustment to MS can be viewed as the ability to adopt a positive view on life, continuing to grow and develop in spite of the difficulties caused by MS (Chalk, 2007; Marks & Millard, 1990). Irvine, Davidson, Hoy & Lowe-Strong (2009) found that patients who were diagnosed with MS presented with denial, concealment and diminished self-confidence. However, the majority of their participants reported that, over time, their values and view of the disease were changed in a positive way. Research has emphasized the identification of factors which differentiate individuals who display positive adjustment and better functional outcomes from individuals who display maladjustment and poorer functional outcomes following diagnosis of various chronic illnesses. Such studies have demonstrated that individual differences such as better problem-solving skills, verbal learning ability and positive self-efficacy have been associated with psychological adjustment in spinal cord injury, vision impairment, and multiple sclerosis (Dreer, Elliott, Fletcher & Swanson, 2005; Dreer, Elliott & Tucker, 2004; Elliott, Bush & Chen, 2006; Motl, McAuley, Wynn, Sandroff & Suh, 2013; Riazi, Thompson, & Hobart, 2004; Schmitt & Elliott, 2004; Wassem, 1992). Riazi et al., (2004), for example, found that higher self-efficacy in persons with MS has been shown to predict improved health status during inpatient rehabilitation or steroid treatment for relapses. Thus, self-efficacy is a particularly relevant characteristic to investigate in relation to psychosocial adjustment and functional outcomes in MS.

Self-efficacy refers to the belief of an individual in their own ability to effectively cope with challenging situations. It involves the belief that one can successfully exert control over challenging conditions (Bandura, 1977). A substantial body of literature exists concerning the relationship between self-efficacy and health, including health promoting behaviors, adjustment, and adherence to medical regimens. In persons with MS, a significant association has been found between self-efficacy and physical, and social functioning (Amtmann et al., 2012). Another study (Motl et al., 2013), examined the associations between individual level changes in physical activity, self-efficacy, and HrQOL over a one-year period. Their findings suggested that both physical activity and self-efficacy were important for improving HrQOL but self-efficacy has been shown to be more important. Additionally, self-efficacy was a significant predictor of psychosocial adjustment, and of disease management and adjustment in MS (Eccles & Simpson, 2011; Mohr, Boudewyn, Likosky, Levine & Goodkin, 2001; Wassem, 1992). Higher levels of self-efficacy have been associated with adherence to intramuscular self-injection of medications for both relapsing-remitting and progressive forms of MS (Fraser, Hadjimichael & Vollmer, 2001; Fraser,

Hadjimichael & Vollmer, 2003; Fraser, Morgante, Hadjimichael & Vollmer, 2004). In addition, Yorkston, Kuehn, Johnson, Ehde, Jensen, & Amtmann (2008) concluded that the subjective importance of participation in everyday situations is relatively independent of measures of mobility, general health, depression, fatigue and pain, but closely linked to self-efficacy. Finally, various intervention studies have been carried out in which self-efficacy is a primary outcome and/or target of treatment (e.g., Ng et al., 2013; Stuifbergen, Becker, Blozis, Timmerman, Kullberg, 2003). For example, Ng et al., (2013) applied a wellness treatment program for a group of individuals with MS and found that it resulted in improved self-efficacy and importantly improved HrQOL. Thus, self-efficacy is a primary factor in facilitating psychological adjustment to MS.

Depression is also a common symptom experienced by people diagnosed with MS (Arnett, Barwick & Beeney, 2008; Siegert & Abernethy, 2005), that can hinder psychological adjustment following diagnosis of MS. High rates of depression have been associated with reduced quality of life (Benito-León, Morales, Rivera-Navarro & Mitchell, 2003). Vanner, Block, Christodoulou, Horowitz, & Krupp (2008) found that symptoms of depression, low levels of self-efficacy, cognition and QOL were all associated with less involvement in leisure and physical activities. Lower levels of self-efficacy have also been found to be a significant predictor of depression in MS (Amtmann et al., 2012; Garfield & Lincoln, 2012; Shnek, et al, 1997). Thus, it has been proposed that individuals with low levels of self-efficacy may perceive themselves as not being able to cope, and subsequently present with higher levels of psychological distress, namely depression and anxiety (Thornton, Tedman, Rigby, Bashforth, & Young, 2006).

While research has identified a significant relationship between self-efficacy and emotional symptomatology, previous work has failed to examine the role of disease related characteristics (e.g. time since diagnosis, MS course, and level of physical functioning) in this relationship. Given the variability presented by MS (i.e. disease duration, MS course, physical disability) and the significant association between symptoms of depression and self-efficacy, these variables should be taken into consideration when studying psychological factors, such as self-efficacy. This will help clinicians and researchers to develop an understanding of how MS symptoms impact the individual. The current study addresses this void in the literature by examining the relationship between disease variability, affective symptomatology and self-efficacy, along with their relationship to HrQOL. Such knowledge will help clinicians identify persons at risk for poor psychological adjustment to life with MS and will allow them to proactively provide additional needed support to facilitate optimal psychological functioning, particularly as disease progression ensues.

This study investigates whether self-efficacy predicts self-reported physical, cognitive and social functioning in MS when controlling for variability in impairment due to disease related factors and depressive symptomatology. The results of this study provide information about psychosocial adjustment and its association with HrQOL outcomes in MS above and beyond the contributions of disease-related factors and depressive symptomatology.

Method

Participants

Participants consisted of 81 individuals with a diagnosis of clinically-definite MS in accordance with the criteria of McDonald et al., (2001). Participants were recruited from clinics in New Jersey, as well as through advertisements distributed at local support groups. In addition, participants from previous MS studies in our laboratory were invited to participate in the current study.

Participants were between the ages of 29 and 67 ($M_{\text{age}} = 48.6$, $SD = 9.3$), at least 1 month post most recent exacerbation, and free of corticosteroid use. Participants were excluded if they had a history of any neurological disease aside from MS (i.e. epilepsy, TBI, stroke, aneurysm), a history of alcohol or drug abuse, or major psychiatric disturbance. Participants were highly educated ($M = 15.5$ years, $SD = 2.4$) and were predominantly women (75%). High variability was noted in the number of months since MS diagnosis ($M = 172$ months, $SD = 112$). However, overall physical disease severity, as measured by the Ambulation Index, was mild ($M = 2.9$, $SD = 2.3$). Table 1 presents demographic characteristics and disease history of the final sample.

Measures

Self-Efficacy—The *Multiple Sclerosis Self-Efficacy Scale* (MSSE; Schwartz, Coulthard-Morris, Zend & Retzlaff, 1996) was designed specifically to evaluate self-efficacy in MS. The measure consists of 18 items rated on a Likert-type scale which contribute to two subscales- the SE Function and SE Control Scales. High levels of internal consistency and test-retest reliability have been reported for the measure. Raw scores on the measure were converted to standard scores with a mean of 100 and standard deviation of 15 using published normative data (Schwartz, Coulthard-Morris, Zend & Retzlaff, 1996). The overall standard score on the questionnaire served as the measure of self-efficacy in this study.

Physical and Social Functioning—The *SF-36 Health Status Questionnaire* is a widely used self-report measure of health-related quality of life (Ware & Sherbourne, 1992; Hays, Sherbourne & Mazel, 1993). The SF-36 contains subscales designed to assess multiple domains of quality of life. This measure has demonstrated high levels of reliability and validity in both general patient samples (Stewart, Hays & Ware, 1988) and in persons with MS (Vickrey, Hays, Harooni, Myers & Ellison, 1995). For this study, the z-score on the physical functioning subscale was selected as the measure of self-reported physical functioning and the z-score on the social function subscale was selected as the measure of self-reported social functioning.

Cognitive Functioning—The *Perceived Deficits Questionnaire* is a 20-item self-report measure designed to assess subjective cognitive impairment in attention/concentration, planning/organization, retrospective memory and prospective memory in persons with MS (Sullivan, Edgley & Dehoux, 1990). The total score on this measure was used to assess the subjective experience of perceived cognitive impairment in this study. Higher scores reflect greater levels of subjective cognitive impairment.

Depressive Symptomatology—The *Chicago Multiscale Depression Inventory* (Nyenhuis et al., 1998) is a self-report depression measure designed to assist in differentiating between the various aspects of depression (i.e. vegetative, affective, evaluative). Given the physical symptoms of MS, this distinction is particularly important in research with this population. The CMDI shows high internal consistency and good convergent and discriminant validity (Nyenhuis et al., 1998). The mood subscale score was used as the indicator of depressive symptomatology in this sample.

Mobility—Ambulation Index (AI; Hauser et al., 1983): The AI is a rating scale to assess mobility by evaluating the time and degree of assistance required to walk 25 feet. Scores range from 0 (asymptomatic and fully active) to 10 (bedridden). Sharrack, Hughes, Soudain, & Dunn, (1999) found that the AI correlated with other measures of impairment, disability and quality of life scales. In many studies the AI is used as a proxy of motor function abilities and physical disability status (Cavanaugh, Gappmaier, Dibble, & Gappmaier 2011; Schultheis, Garay & DeLuca, 2001).

Procedures

Data presented in the current study was gathered during the baseline assessment of a large clinical trial examining the efficacy of a treatment for memory impairment for individuals with MS. The study was approved by the Kessler Foundation Institutional Review Board and all procedures were HIPAA compliant. Prior to enrollment in the full treatment protocol, potential participants underwent a 2-part screening: (1) an initial screening examination via telephone which gathered demographic and disease related information (e.g. age, education, medications, duration of illness) and (2) a detailed, in-person screening, which gathered information on objective cognitive performance. This study includes all persons that completed both of these screening examinations. Prior to undergoing the detailed screening, all potential subjects signed an informed consent form approved by the Institutional Review Board.

Data Analysis

Pearson product moment correlations were conducted to explore the relationships among self-efficacy, HrQOL, depressive symptomatology, and disease related variables (i.e. time since diagnosis, MS course and AI). Hierarchical regression analysis was then used to evaluate the relationship between self-efficacy and self-reported physical, cognitive, and social functioning. Individual analyses were conducted for each of the three domains. The disease-related variables of Ambulation Index Score, type of MS, and months since diagnosis were entered in the first step of the equation to control for variability in functional outcomes due to degree of neurological impairment. The CMDI Mood Subscale t-score was entered in the second step to control for the impact of depressive symptomatology. Finally, the total score on the MSSE was entered in the third step as a measure of self-efficacy. The dependent variables for the three analyses were the SF-36 Physical Functioning Z-score (Physical Functioning), PDQ Total Score (Cognitive Functioning), and SF-36 Social Functioning z-score (Social Functioning) This design allowed us to investigate the relationships between self-efficacy and HrQOL (e.g. self-reported physical functioning, cognitive problems, and social functioning) above and beyond the variability in outcome

that can be predicted by neurological status and depressive behavior. Note, diagnostic tests for multicollinearity confirmed the absence of multicollinearity among the variables utilized. Variance inflation factor values for all variables in the regression equations were smaller than 5, and tolerance was greater than .10. All tests of significance were determined by $p < .05$.

Results

The MS sample demonstrated average overall self-efficacy as evidenced by a mean standard score for the MSSE Total Score of 107.7 (SD = 15.1, range 60.3 to 130.8). On average, the group showed low levels of depression (Average CMDI Mood Subscale T-score 53.3, SD = 12.6, range = 39.78 to 103.19). Means and standard deviations for the remaining predictor and criterion variables are presented in Table 1. Overall, the participants displayed significant impairment in physical functioning (HSQ Physical Functioning Scale z-score mean -1.7 , SD = 1.3, range -3.69 to 0.68), moderate levels of subjective cognitive impairment (PDQ Total score average 33.8, SD = 14.3, range = 2.00 to 66.00), and mild impairment in social functioning (HSQ Social Functioning Scale z-score average -0.94 , SD = 1.1, range = -3.74 to 0.73).

Pearson product moment correlations indicate that higher levels of self-efficacy are significantly associated with better physical, social and cognitive functioning. Higher self-efficacy is also associated with better mobility (AI) and less self-reported depressive symptomatology (Table 2). Depressive symptomatology is also significantly related to self-reported social functioning and subjective cognitive impairment such that higher levels of depressive symptomatology are associated with greater levels of subjective cognitive impairment and poorer social functioning. However, depressive symptomatology is not significantly associated with disease related variables such as AI score, time since diagnosis and MS type (Table 2).

Self-reported Physical Functioning

Hierarchical regression analysis for self-reported physical functioning demonstrated that self-efficacy is a significant predictor of self-reported physical functioning (Table 3). In the first step of the equation, the block of disease-related variables comprised of months since diagnosis, type of MS (relapsing-remitting, primary progressive, secondary progressive) and the Ambulation Index Score was a significant predictor of self-reported physical functioning ($R^2 = .58$, $F(3, 63) = 27.5$, $p < .001$). A higher Ambulation Index Score was associated with poorer self-reported physical functioning ($\beta = -3.8$, $p < .001$). This block accounted for 58% of the variance in self-reported physical functioning. On the second step of the equation, depressive symptomatology was not significant. In the final step of the equation, self-efficacy significantly predicted self-reported physical functioning ($R^2 = .66$, $F(1, 63) = 22.4$, $p < .001$). Self-efficacy accounted for an additional and unique 6.5% of the variance in self-reported physical functioning, after controlling for the contributions of disease-related factors and depressive mood ($R^2 = .06$, $F(1, 58) = 10.9$, $p = .002$).

Subjective Cognitive Functioning

In the hierarchical regression analysis predicting subjective cognitive functioning, self-efficacy was found to significantly predict self reported cognitive functioning (Table 4). In the first step of the equation, the block of disease-related variables comprised of months since diagnosis, type of MS (relapsing-remitting, primary progressive, secondary progressive) and the Ambulation Index Score was a significant predictor of perceived cognitive impairment ($R^2 = .13$, $F(3, 63) = 2.8$, $p < .001$). Ambulation Index Score ($\beta = -2.3$, $p = .005$) was associated with higher levels of perceived cognitive impairment such that higher Ambulation Index scores (reflecting greater physical impairment) predicted higher levels of subjective cognitive impairment. This block accounted for 12.7% of the variance in self-reported cognitive functioning. Depressive symptomatology was a significant predictor of subjective cognitive impairment at the second step of the equation ($R^2 = .25$, $F(1, 59) = 4.9$, $p = .002$) accounting for an additional 12.4% of the variance in perceived cognitive impairment. Higher levels of depressive symptomatology were associated with greater levels of subjective cognitive impairment. In the final step of the equation, self-efficacy accounted for an additional 10% of the variance and was a significant predictor of perceived cognitive impairment $R^2 = .35$, $F(1, 58) = 6.2$, $p < .001$).

Self-reported Social Functioning

Hierarchical regression analysis revealed self-efficacy to be a significant predictor of self-reported social functioning (Table 5). In the first step of the equation, the block of disease related variables (months since diagnosis, type of MS and Ambulation Index score) did not significantly predict self-reported social functioning, ($R^2 = .10$, $F(3, 60) = 2.2$, $p = .08$). At the second step, depressive symptomatology significantly predicted self-reported social functioning ($R^2 = .39$, $F(1, 59) = 9.4$, $p < .001$) accounting for 38% of the variability in self-reported social functioning. Higher levels of depression were associated with poorer self-reported social functioning. In the final step of the equation, self-efficacy significantly predicted social functioning ($R^2 = .49$, $F(1, 58) = 11.1$, $p < .001$) accounting for an additional 11% of the variance in social functioning after variance attributable to disease-related variables and depressed mood was accounted for. Higher levels of self-efficacy were associated with better self-reported social functioning.

Discussion

The results of this study support the hypothesis that self-efficacy is associated with and predictive of self-reported physical, cognitive and social functioning when controlling for variability due to degree of neurologic impairment and self-reported depressive symptomatology. Results indicate that self efficacy demonstrates a strong and consistent association with HrQOL in persons with MS. Specifically, individuals with MS who reported better self-efficacy also reported better HrQOL, less symptoms of depression and had better mobility functioning as indicated by the AI. Note, that self-reported symptoms of depression were only associated with negative reports of HrQOL and self-efficacy, but not with variability related to disease characteristics (i.e. MS type, AI score and time since diagnosis). These results are consistent with previous findings (Garfield & Lincoln, 2012),

which concluded that a person's perception of his/her disability can have a significant impact on mood and vice versa.

Self-efficacy was found to be a significant predictor of physical functioning such as walking and climbing stairs, even after the contributions of the degree of neurologic impairment have been taken into account. Thus, individuals with higher levels of self-efficacy report better functional outcomes for physical activities than individuals with lower levels of self-efficacy who experience the same level of neurologic impairment. Similarly, Motl, McAuley and Snook (2007) found that greater physical activity in the community is associated with higher levels of self-efficacy in MS. However, their study did not control for the underlying differences in physical abilities secondary to neurological impairment, such as ambulation index and time since diagnosis. Kosma, Ellis, and Bauer (2012) also noted a similar finding that self-efficacy was one of the best predictors of the initial levels of physical activity in individuals with MS and spinal cord injury. The present data suggest that self-efficacy is an important factor in perceptions of physical abilities, beyond the impact of objective physical disability. In progressive conditions such as MS, the identification of characteristics which can influence the impact of perceptions related to functional outcomes is significant.

Interestingly, variability related to disease characteristics and depressive symptomatology, together with self-efficacy, were all significant predictors of subjective cognitive functioning. The finding that the disease characteristics and self-reported symptoms of depression accounted for the majority of the variability in self-reported cognitive impairment is consistent with previous research investigating the impact of disease progression and depression on cognitive function (e.g. Demaree, Gaudino & DeLuca, 2003; O'Brien, Gaudino-Goering, Shawaryn, Komaroff, Moore, & DeLuca, 2007; Zivadinov, et al, 2001). This highlights the importance of these factors in the self-evaluation of cognition and encourages clinicians not to rely exclusively on symptom self report in patient care.

Self-efficacy also significantly predicted 10% of the variance in self-reported social functioning after the 28% of variability due to depressive symptomatology had been accounted for. Given the known impact of social support and related constructs in the lives of individuals with chronic health conditions such as MS (Mitchell, Benito-León, Gonzales & Rivera-Navarro, 2005), maintaining close relationships and engaging in regular social activities are very important for promoting optimal quality of life. Specifically, social support has been shown to be related to participation in leisure activities (Elliott & Shewchuk, 1995) and is associated with the incidence of secondary conditions (Herrick, Elliott & Crow, 1994) in spinal cord injury. Results of the current study suggest that self-efficacy is an important determinant of social functioning in MS independent of the impact of disease and depression.

The significant role of depression in two of the three prediction models should not be overlooked. Depression was noted to be a significant predictor of both self-reported cognitive impairment and self-reported social functioning. This is consistent with previous research demonstrating a relationship between depression and subjective cognitive problems (Lovera, et al, 2006; Marrie, Chelune, Miller & Cohen, 2005; Moar, Olmer & Mozes, 2001), and with social support (Kirchner & Lara, 2012). Thus, persons with MS face not only

physical limitations and cognitive impairments, but a whole series of psychosocial stressors, which may adversely affect their quality of life. These findings indicate that the effective treatment of depression in persons with MS could have far reaching impact on overall functioning in MS.

In sum, the relationships between self-efficacy and self-reported physical, cognitive and social functioning were significant even after accounting for variance due to degree of neurologic impairment and symptoms of depression. Individuals who display higher levels of self-efficacy may experience and perceive less functional decline with worsening disease status and increased depression. The ability of self-efficacy to serve as a protective factor for functional outcomes in individuals with MS is important to clinical care. Specifically, given the importance of self-efficacy in functional outcomes, the development and validation of interventions designed to improve self-efficacy represents an important area of focus for MS research. In a recent systematic review, Rae-Grant, Turner, Sloan, Miller, Hunziker, & Haselkorn (2011) reported that one of the primary interventions for improving self-efficacy is self-management interventions. They concluded that self-management programs may foster awareness; improve self-efficacy and skills to help prevent negative health related outcomes. A recent example by Ng et al., (2013) illustrated that a self-management type of intervention, a wellness program, resulted in improvement in self-efficacy and HrQOL in persons with MS, with changes demonstrating stability across 6 months. However, Rae-Grant et al., (2011) reported that only 3 studies provided class I evidence to support self-management programs. More research examining mechanisms by which one can improve self-efficacy in MS and subsequently impact overall HrQOL is thus needed.

Limitations

One of the major limitations of this study is the reliance on cross-sectional data, which limits our ability to evaluate the long-term impact of self-efficacy in the lives of individuals with MS. Given that self-efficacy develops through experience, longitudinal research is likely to provide important information concerning the impact of changes in disease status and other life events on self-efficacy, as well as related to the impact of self-efficacy on functional outcomes. Both self-efficacy and HrQOL measures are based on self-report and subjective in nature. Future research should further investigate this relationship by using also objective outcome measures. In addition, even though the AI was used to characterize physical disability, it relates mainly to mobility, and not other aspects of motor function such as fine motor skills. Last, generalizability of study findings (external validity) may be limited due to a sample of relatively high functioning persons with MS. It is therefore recommended that the association between self-efficacy and HrQOL be investigated in a sample of persons with more severe symptoms.

Future Research

The present study combined with previous research investigating the association between self-efficacy and health and health-related behaviors in individuals with MS and other chronic health conditions, highlight the saliency of self-efficacy. In MS, self-efficacy has been associated with outcomes, including psychosocial functioning and response to medical treatment. Research on self-efficacy in MS has focused on self-efficacy for specific tasks

such as self-injection (Mohr, Boudewyn, Likosky, Levine & Goodkin, 2001), participation (Yorkston, et al, 2007) and health promotion activities (Ennis, Thain, Boggild, Baker, & Young, 2006). Taken together, self-efficacy is a particularly relevant variable to target in intervention designed for individuals with MS.

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Impact

- Although the relationship between self-efficacy and some aspects of quality of life has previously been examined, this study is the first to examine the relationship between self-efficacy and quality of life after accounting for disease related characteristics (e.g., time since diagnosis, MS course, level of physical functioning) and depression.
- Self-efficacy plays a significant role in an individual's adjustment to MS across multiple areas of functional outcome, beyond that which is accounted for by disease related variables and depression
- Rehabilitation programs should incorporate mechanisms for increasing patients' self-efficacy. Self-efficacy is an important target for behavioral and self-management interventions in an effort to improve the health related quality of life (HrQOL) of persons with MS. In addition, it is important to identify people reporting high symptoms of depression as it can negatively impact self-efficacy and self-reports of HrQOL

Table 1

Demographics of Multiple Sclerosis Sample (n=81)

Characteristic	<i>n</i>	%	<i>M</i>	<i>SD</i>
Age (years)			48.6	9.3
Education (years)			15.6	2.4
Months since Diagnosis			172.1	112.0
Ambulation Index Score			2.9	2.3
Gender				
Men	20	25		
Women	61	75		
MS Subtype				
Relapsing-Remitting	54	66.6		
Primary-Progressive	5	6.1		
Secondary Progressive	16	19.7		
Progressive relapsing	1	1.2		
Unknown course	5	6.1		

Table 2

Correlations Used in Hierarchical Regression Analyses.

Variable	1	2	3	4	5	6	7	8
1. PhysFunc	---	-.001	.39**	-.426**	-.23	-.75**	-.23*	.553**
2. CogImp		---	-.42**	-.019	-.04	-.26*	.49**	-.33**
3. SocialFunc			---	-.30**	-.17	-.19	-.51**	.496**
4. MS Type				---	.24*	.48**	.08	-.30**
5. MSD					---	.28*	-.06	-.06
6. AI						---	.003	-.38**
7. CMDI Mood							---	-.39**
8. MSSE								---

Note: N=34; PhysFunc = Self-reported Physical Functioning, CogImp = Perceived Cognitive Impairment, SocialFunc = Self-Reported Social Functioning, MS Type = Type of Multiple Sclerosis (Relapsing-Remitting, Primary Progressive, Secondary Progressive), MSD = Months Since Diagnosis, AI = Ambulation Index Score, CMDI Mood = Chicago Multiscale Depression Inventory Mood Subscale Score, MSSE = Total Score on the Multiple Sclerosis Self-Efficacy Scale

* $p < .05$,
 ** $p < .01$

Table 3

Multiple Regression of Self-Efficacy on Physical Functioning

Variable	df	R ²	R ²	F	β
Step One	3,60	.58	.58	27.5***	
MS Type					-.07
Months Since Diagnosis					-.008
Ambulation Index Score					-.72***
Step Two	1,59	.59	.01	2.1	
Depressed Mood					-.12
Step Three	1, 58	.65	.065	10.9***	
Self-Efficacy					.29**

*Note.***
 $p < .01$,***
 $p < .001$

Table 4

Multiple Regression of Self-Efficacy on Perceived Cognitive Impairment

Variable	df	R ²	R ²	F	β
Step One	3,60	.127	.127	2.8*	
MS Type					.17
Months Since Diagnosis					.007
Ambulation Index Score					-.402**
Step Two	1,59	.251	.124	4.9**	
Depressed Mood					.35***
Step Three	1, 58	.351	.100	6.2***	
Self-Efficacy					-.36***

*Note.** $p < .05$,** $p < .01$,

Table 5

Multiple Regression of Self-Efficacy on Social Functioning

Variable	df	R ²	R ²	F	β
Step One	3,60	.103	.103	2.2	
MS Type					-.27
Months Since Diagnosis					-.12
Ambulation Index Score					-.006
Step Two	1,59	.389	.287	27.7***	
Depressed Mood					-.54***
Step Three	1, 58	.491	.101	11.5***	
Self-Efficacy					.370**

Note.

* $p < .05$,

** $p < .01$,

*** $p < .001$