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## Quality of life and psychological well-being in the early stages of multiple sclerosis (MS): Importance of adopting a biopsychosocial model

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### Abstract

**Background**—Reductions in quality of life (QOL) exist among individuals with multiple sclerosis (MS).

**Objective**—The present investigation aimed to adopt a biopsychosocial model in examining QOL in the early stages of MS.

**Methods**—Individuals with MS (34 with average to low QOL and 35 with high QOL) were compared on measures of disease symptoms, psychological functioning, personality, self-efficacy, locus of control (LOC), social support, and coping to determine the most salient predictors of QOL.

**Results**—Individuals were matched on disease course and duration. Individuals with lower QOL reported more fatigue, sleep problems, pain, depression, and anxiety ( $d = .83 - 1.49$ ,  $p$ 's  $< .001$ ). They also reported lower levels of self-efficacy, LOC, and social support ( $d = .75 - 1.50$ ,  $p$ 's  $< .01$ ). They indicated higher levels of neuroticism ( $d = 1.31$ ,  $p < .001$ ) and lower levels of extraversion ( $d = 1.21$ ,  $p < .001$ ) and reported greater levels of disengagement as a means of coping ( $d = .75$ ,  $p = .002$ ). Those with high QOL endorsed more use of adaptive coping ( $d = .52 - .86$ ,  $p$ 's  $< .05$ ). When taken together, LOC and anxiety were the most significant predictors, accounting for 40% of the variance.

**Conclusion**—Even early on in the illness, there exists differing levels of QOL. Identifying the psychological and social variables as well as the disease related factors is important, and in this case, may make a much greater contribution. Efforts to assure routine assessment and effective intervention aimed at these factors are warranted, particularly as an early intervention to assure maintenance/improvement in QOL among individuals with MS.

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## Keywords

Quality of Life; Well-being; Locus of Control; Self-efficacy; Coping; Personality

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## Introduction

Multiple sclerosis (MS), a demyelinating disease of the central nervous system (CNS), is the number one cause of neurological disability among young and middle-aged adults,<sup>1-3</sup> affecting women twice to three times as often as men<sup>4</sup> with an age of diagnosis ranging from 20 to 50 years of age.<sup>3</sup> Common primary symptoms of MS include difficulties or changes in gait, tremors, visual problems, bladder and bowel incontinence, numbness/tingling in extremities, chronic pain, spasticity, abnormal somatic sensations, sexual dysfunction, and speech disturbances.<sup>5</sup> Secondary symptoms include fatigue, depression, sleep disturbance, and cognitive disturbance, which occur at extremely high rates. In particular, fatigue is reported in approximately 53% to 90% of individuals with MS<sup>6,7</sup> and is reported by many as their worst symptom.<sup>8</sup> Rates of lifetime depression in MS are as high with point prevalence rates varying between 15-50%<sup>9</sup> and available research suggests that individuals with MS are three times more likely to experience sleep difficulties than controls, with prevalence rates ranging from 36% to 62%.<sup>10,11</sup> Finally, between 40-50% of community based MS samples have typically been shown to display cognitive impairment<sup>12</sup> with prevalence rates usually being higher in clinic based samples, around 55-65%.<sup>13</sup> In sum, there is a host of factors associated with MS that have been shown to significantly contribute to reductions in quality of life in MS, which is the focus of the present investigation.<sup>14-17</sup>

Quality of life (QOL), in general, is defined as a subjective satisfaction with life,<sup>18</sup> while health related quality of life (HRQOL) has been considered to be the capacity to derive satisfaction from meaningful behavior despite one's disease.<sup>19</sup> Psychological well-being (PWB), on the other hand, defines a more comprehensive sense of well-being that includes actualizing one's potential, living well, having a sense of purpose, and securing good relations with others.<sup>20</sup> Identification of one's life meaning or purpose in life and personal growth, particularly in light of a diagnosis of a progressive illness, provides a much fuller picture of an individual and their overall well-being and is intricately intertwined with HRQOL and equally relevant to MS and assessment of one's overall QOL. To date, PWB has received very little attention in MS as the majority of studies focus on general QOL, such as life satisfaction and HRQOL. Given that the onset of MS occurs at such an early age, the effects of this disease on QOL as well as PWB may be more devastating and detrimental than other neurological conditions. Individuals diagnosed with the disease are usually high functioning, young individuals at the time of disease onset. Furthermore, many are just beginning to make life decisions regarding such issues as employment and family life that are now hindered by their disease. In fact, rates of unemployment are estimated to range anywhere from 24% to as high as 80%,<sup>21</sup> and approximately 70% to 80% of individuals with MS are unemployed five years after being diagnosed.<sup>22</sup> Reports also suggest that MS leads to reductions in individuals' abilities to fulfill social roles.<sup>23</sup> Such influence is likely to result in some detriment in QOL and well-being. In fact, it has been found that men and women

with MS aged 25-44, an age at which important early life decisions are often made, experienced more depression than their age matched, healthy counterparts.<sup>24</sup>

For decades, researchers and practitioners have attempted to understand the factors associated with the reduction and/or maintenance of QOL in MS. The factors include both disease related variables as well as a host of psychosocial factors. With regard to disease related factors, fatigue and cognitive impairment have been found to be the greatest culprits in reducing QOL in MS. Fatigue is a significant predictor of the physical domain of HRQOL,<sup>25</sup> health perception, and social function as well as role limitations due to physical dysfunction after adjusting for physical disability and depression.<sup>26</sup> Poor cognitive functioning has also long been known to be related to reduced QOL.<sup>27</sup> In their seminal study, Rao and colleagues showed that individuals with greater cognitive dysfunction were less likely to be employed, engaged in fewer social activities, experienced greater difficulties in completing routine household tasks and exhibited more psychopathology than those with intact cognitive functioning. More recently, Schwartz & Frohner<sup>28</sup> found that, in conjunction with longer disease duration and perceived social support, less cognitive impairment was also associated with greater mental health and HRQOL as measured by the mental health scale of the Multiple Sclerosis Quality of Life Inventory (MSQLI).

When examining the role of the disease itself, a severe and progressive course has consistently been linked with poorer QOL in MS.<sup>29</sup> Disease severity has also been shown to contribute to reductions in QOL. However, disease severity has been fairly insufficient in explaining psychosocial disability and QOL in MS. In fact, some of the earliest studies in the 1980s suggested that disease severity accounts for very little when it comes to functioning and QOL. In particular, LaRocca et al (1985)<sup>30</sup> found that disease severity (along with age, gender, and education level) only accounted for 14% of the differences in employment status and Harper et al (1986) showed that only 2%, 12%, and 14% of mental health, social health, and perceived QOL, respectively could be accounted for by disease severity. The inclusion of demographics increased this to 13%, 20%, and 21%, respectively.<sup>31</sup> Nearly a decade and half later, similar findings were found by Koch et al in which 18% of the variance in QOL could be predicted by disease symptoms, education, age, and employment status.<sup>32</sup> Thus, nearly 80% or more of the variance in QOL is left unexplained. Finally, duration of illness has been shown to have both a negative<sup>33</sup> and positive effect on QOL,<sup>28</sup> suggesting a bimodal distribution with an initial period following diagnosis and greater disability later on in the illness having the greatest impact on QOL. One may speculate that this is due to a reactionary experience early on and greater disability later on in the illness. Given this, many contend that the disease itself is not the primary contributor to poor QOL. Such contentions are consistent with a biopsychosocial model (BPS), which suggests that biological, psychological, and social factors must all be considered simultaneously in order to fully appreciate the patient's subjective experience of their illness and its overall impact on their functioning, QOL, and overall well-being. In contrast to a biomedical model, which attributes disease impact primarily to biological factors, the BPS also takes into account psychological (e.g., mood, personality, behavior) and social factors (e.g., social support, familial and socioeconomic factors) when understanding and appreciating the impact of an illness.

Of the multitude of psychological and social factors thought to influence QOL in MS, depression has been consistently shown to be the greatest determinant.<sup>34,35</sup> Other psychological or person-specific factors include anxiety, self-efficacy, and coping.<sup>36</sup> Perceived social support has also been shown to be a significant factor associated with QOL in MS.<sup>28</sup> These factors have been shown to greatly contribute to QOL above and beyond disease variables. In fact, Wollin et al (2013) found that depression, anxiety, self-efficacy, social support, and stress accounted for an additional 40% of the variance in predicting QOL when disease severity and duration were accounted for.<sup>36</sup> Self-efficacy has consistently been hailed as a great determinant in MS with regard to several outcomes, including health status,<sup>37</sup> adherence to treatment,<sup>38</sup> disease management,<sup>39</sup> adjustment,<sup>40</sup> physical and social functioning,<sup>41</sup> and physical activity and HRQOL.<sup>42</sup> A more recent investigation found self-efficacy to be a significant predictor of physical, social, and cognitive functioning in MS, even when taking into account neurologic impairment and depression.<sup>43</sup> In general, self-efficacy can have substantial impact on how an individual contends with the diagnosis of MS and foresees being capable of managing the illness effectively. Bandura's definition of self-efficacy is a confidence in one's own capabilities to manage situations with the skills they possess to overcome specific challenges.<sup>44</sup> Bandura also spoke of the fact that it is not one's ability, per se, but their belief that they can accomplish their goals that determines success. Thus, while MS is an unpredictable and varying illness, one's belief in their ability to overcome the obstacles associated with the illness early on is likely more dependent on this pre-existing trait than the illness itself in the beginning stages when much is unknown. A construct similar to self-efficacy is locus of control (LOC) has also been shown to play a role in the adjustment to MS. In particular, Wassef aimed to answer the question as to why, "Many MS clients were demoralized by their inability to control this unpredictable disease, while others were empowered to manage their illness?" She reasoned that LOC was likely the culprit in explaining these differing trajectories and in fact found it to be the case. More specifically, individuals with an internal LOC were found to have a milder course, were more knowledgeable regarding their MS, and engaged in more health-related behaviors or self-care than those with an external oriented LOC.<sup>45</sup>

Finally, Benedict et al (2005) found that personality greatly contributed to QOL in MS. More specifically, the facet of conscientiousness, in conjunction with depression, accounted for 63% of the variance when predicting overall QOL.<sup>46</sup> Given these findings and the potential role that these factors can have independent of the disease, the present investigation adopted a BPS approach to determine the differences in disease symptoms (e.g. fatigue), psychological functioning, person-specific factors (e.g., self-efficacy, personality), social functioning, and coping between individuals with self-reported high QOL and those with reportedly average to low QOL early on in the disease process, that is within the first five years. Moreover, a model as to which factors account for the greatest variance in predicting QOL was analyzed. Previous investigations examining these factors in a recently diagnosed sample (< 1 year) found reductions in self-perceived health, QOL, and psychological well-being that was independent of neurological disability.<sup>47</sup> Thus, in the present study it was hypothesized that a combination of factors (i.e., psychological, social, and physical) would contribute to QOL, with a greater contribution of psychological and social factors during the

earlier stages of the disease. Such findings would suggest that these factors should be addressed early on in the disease process.

## Methods

### Participants

All participants (n=69) were diagnosed with clinically definite MS and had enrolled in a prospective, longitudinal investigation examining the factors associated with employment status in MS. Eligibility criteria included age ranging from 20 to 64, absence of other neurological disorders, not having an exacerbation in the past month, and being presently employed. Individuals with a relapsing remitting course and disease duration of less than or equal to five years were selected for the current investigation. Participants completed the Satisfaction with Life Scale,<sup>48</sup> a brief, five-item measure of QOL and subjective well-being. The SWLS has been used previously in the MS literature<sup>49</sup> and found to be valid and reliable in this population.<sup>50,51</sup> Individuals who scored in the “high” or “very high” range constitute the “High QOL” group, while those who rated themselves as “average” to “extremely dissatisfied” were considered to be in the “Low to average QOL” group. All participants then completed an online survey consisting of questionnaires assessing disease symptoms (e.g., fatigue), health-related QOL, subjective and psychological well-being, perceived stress, perceived success, personality, self-efficacy, locus of control (LOC), and coping. All study procedures were approved by the Institutional Review Board of Kessler Foundation. Informed consent was obtained from all participants.

### Measures

Health-related QOL (HRQOL) was assessed by the Health Status Questionnaire (SF-36),<sup>52</sup> which assesses several domains of health-related quality of life and consists of a mental and physical health component summary score, which were utilized in this study. Higher scores indicate greater perceived HRQOL. Psychological well-being was assessed by the Ryff Scales of Psychological Well-being (Ryff PWBS).<sup>20</sup> This measure consists of six subscales: personal relationships, autonomy, personal growth, purpose in life, environmental mastery, and self-acceptance. The Perceived Stress Scale (PSS)<sup>53</sup> was utilized to assess one’s perception of general stress in life, while the Flourishing Scale (FS)<sup>54</sup> was used to determine one’s self-perceived success in areas such as relationships, self-esteem, purpose in life, and overall optimism. Higher scores on the PWBS and FS are indicative of greater PWB and QOL, while high scores on the PSS are suggestive of greater stress in one’s life.

The Modified Fatigue Impact Scale (MFIS)<sup>55</sup> was utilized to assess fatigue. The MFIS is a modified form of the Fatigue Impact Scale that was derived from interviews with MS patients concerning how fatigue impacts their lives. It consists of three subscales: physical, cognitive, and psychosocial functioning. The physical subscale was used in the present investigation. The Pittsburgh Sleep Quality Index (PSQI)<sup>56</sup> was used to assess sleep disturbances. The PSQI is a measure of sleep quality consisting of several domains of sleep. Pain was assessed by the MOS- Pain Effects Scale (PES), a brief measure assessing the experience and impact of pain that is part of the MSQLI.<sup>52</sup> Scores in the higher range on these disease measures suggest poorer health and greater disease impact.

Depression and anxiety were measured by the Chicago Multiscale Depression Inventory (CMDI)<sup>57</sup> and the State Trait Anxiety Inventory (STAI),<sup>58</sup> respectively. The CMDI consists of three subscales: mood (e.g., sadness), evaluative (e.g., feelings of uselessness), and vegetative (e.g., fatigue). The STAI is divided into two scales to assess both present (state) and longstanding (trait) anxiety. For the purposes of the present investigation, the mood and evaluative subscales of the CMDI and the trait scale of the STAI were used. Lower psychological functioning is associated with higher scores on these measures.

The Neo Five Factor Inventory (NEO-FFI)<sup>59</sup> was employed to assess personality. The NEO-FFI assesses each of the five personality subscales, Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. Higher scores indicate a greater level of these traits. Self-efficacy was measured by the General Self-efficacy Scale (GSE).<sup>60</sup> A measure of MS-related self-efficacy, the Disability Management Self Efficacy Scale (DMSES)<sup>41</sup> was also administered to assess one's feeling of efficacy with regard specifically to managing their MS. Locus of control (LOC) was assessed by the International Personality Item Pool-Locus of Control Scale (IPIP-LOC).<sup>61</sup> The IPIP-LOC assesses the degree to which individuals perceive having an external versus internal locus of control and one's beliefs in managing a stressor, such as MS. Individuals with greater self-efficacy and an internal locus of control will score higher on these measures. The Modified Social Support Survey (MSSS)<sup>52</sup> was utilized to assess one's perceived level of social support. Individuals who reported being in a relationship also completed the Couples Satisfaction Index (CSI).<sup>62</sup> Greater scores on these two measures indicates greater social support.

Finally, the COPE Inventory<sup>63</sup> was administered to assess different ways individuals respond to stress. It consists of five scales measuring problem-focused coping (Active Coping, Planning, Suppression of Competing Activities, Restraint Coping, Seeking of Instrumental Social Support) and five scales to measure emotion-focused coping (Seeking of Emotional Social Support, Positive Reinterpretation, Acceptance, Denial, Turning to Religion) and three less adaptive coping styles (Focus on and Venting of Emotions, Behavioral Disengagement, Mental Disengagement). Three items also measure Alcohol and Drug Use and four items assess use of Humor. High scores are suggestive of a greater use of the coping style.

**Statistical Analyses**—All statistical analyses were conducted using SPSS version 21.0. Initial comparisons of group means (Independent Student's t-test) and proportions (Chi-Square) were made between the "High QOL" and "Low to Average QOL" with regard to demographic factors, disease variables, health-related QOL, PWB, perceived stress, perceived success, disease symptoms, depression, anxiety, personality, self-efficacy, and locus of control (LOC). A multivariate analysis of variance (MANOVA) was conducted among the subscales of the coping measure to reduce the likelihood of a Type I error given the multiple comparisons. An effect size (Cohen's *d*) was computed for all variables. Five separate logistic regression analyses were then conducted with the following as independent variables: (1) Disease symptoms; (2) Psychological factors; (3) Personality; (4) Self-efficacy/LOC; and (5) Coping. A subsequent final logistic regression was conducted with only the variables found to be significant in these regression analyses to create a full model predicting overall QOL.

## Results

There were no differences with regard to age, gender, education, or disease duration between those with high QOL and those with low to average QOL. (See Table 1).

As shown in Table 2, individuals with low to average QOL consistently report worse physical and mental HRQOL ( $d=.63$ ,  $p=.011$  and  $1.09$ ,  $p<.001$ , respectively), subjective well-being (i.e., depression, anxiety) ( $d's=1.02-1.49$ ,  $p=.001$ ) and PWB ( $d's=.70-1.71$ ,  $p=.001$ ). Large effect sizes were also found on measures of perceived stress ( $d=1.48$ ,  $p<.001$ ) and success ( $d=1.89$ ,  $p<.001$ ), suggesting further convergent validity in the fact that individuals with low to average QOL experience significantly more stress and less feelings of success/flourishing in life and poorer PWB, in general.

On measures of disease symptoms, those with low to average QOL endorse greater fatigue ( $d=.91$ ,  $p<.001$ ), sleep disturbance ( $d=.83$ ,  $p=.001$ ), and pain ( $d=1.10$ ,  $p<.001$ ) (See Table 3).

With regard to personality, individuals with low to average QOL reported greater levels of neuroticism ( $d=1.31$ ,  $p<.001$ ) and lower levels of extraversion ( $d=1.21$ ,  $p<.001$ ). There were no other differences with regard to the other factors of personality. On measures of self-efficacy and LOC, individuals with high QOL reported higher levels of general and MS-specific self-efficacy ( $d=.78$ ,  $p=.002$  and  $d=.76$ ,  $p=.003$ , respectively) and internal LOC, with the largest effect being observed for LOC ( $d=1.50$ ,  $p<.001$ ). Finally, individuals with low to average QOL reported feeling as if they had less social support ( $d=.75$ ,  $p=.001$ ). Of the 58 presently in a relationship, those with high QOL reported greater satisfaction ( $d=.97$ ,  $p=.001$ ).

When asked how they cope with stressors such as MS, individuals with low to average QOL endorsed engaging in maladaptive coping such as behavioral disengagement ( $d=.75$ ,  $p=.002$ ) with a trend for denial ( $d=.46$ ,  $p=.060$ ). In contrast, individuals with high QOL were more likely to utilize problem-focused and adaptive coping such as planning ( $d=.52$ ,  $p=.035$ ), active coping ( $d=.76$ ,  $p=.002$ ), emotional and instrumental social support ( $d=.53$ ,  $p=.032$  and  $d=.82$ ,  $p=.001$ , respectively), humor ( $d=.62$ ,  $p=.013$ ), acceptance ( $d=.86$ ,  $p=.001$ ), and positive reinterpretation and growth ( $d=.82$ ,  $p=.001$ ). (See Table 4).

Logistic regression analyses were conducted to determine the most salient predictors of QOL early on in MS. Among disease symptoms, pain was the most significant predictor that remained in the first model. Anxiety was the sole predictor among psychological variables. Both neuroticism and extraversion remained in the model when examining personality. Only LOC was a significant predictor when considered with the other measures of self-efficacy. Finally, of the coping measure, only behavioral disengagement and acceptance were retained in the model. These seven variables were initially examined for multicollinearity and entered into a final regression. Anxiety and neuroticism were both found to have a variance inflation factor (VIF) greater than 5. As a result, neuroticism was removed from the regression given the larger effects observed with anxiety. When taken together, the only significant factors that remained in the final model when considering pain, anxiety, neuroticism, extraversion, LOC, behavioral disengagement, and acceptance was LOC and anxiety, accounting for 40% of the variance (See Table 5).

## Discussion

Reductions in QOL are well documented in MS. Contributing factors are both disease related and person-specific. In the present investigation, a biopsychosocial model was adopted to better understand QOL in the early stages of MS. It was proposed that early on in the disease process, prior to significant disease involvement, social and psychological factors were likely to have a substantive role on QOL and adjustment to MS and may set the tone for the disease process moving forward. It was found that while certain disease symptoms differed between those with high QOL and those with low to average QOL (i.e., fatigue, sleep disturbance, pain), several social and psychological variables were proven to have a significant impact, especially early on in the disease process. More specifically, in a sample matched on disease and demographic variables, the greatest predictors of QOL early on in the disease process were LOC and anxiety, accounting for 40% of the variance. The finding that LOC was the most significant predictor, accounting for 36% of the variance, is not surprising given past findings that LOC can have a great impact on adjustment to MS. In the present study, LOC demonstrated the largest effect size and was the greatest predictor in distinguishing those with high QOL from those with less in a sample of individuals diagnosed with MS in the last five years.

Groups also differed on depression, self-efficacy, and personality. With regard to the latter finding, it was most striking that the differences in personality were akin to what has been termed the distressed or “Type D” personality. Individuals with Type D Personality are characterized as having a synergistic combination of higher levels of neuroticism and lower levels of extraversion or greater social discomfort.<sup>64</sup> Personality has long been considered a factor that can account for differences in health, well-being, and QOL. The Type D personality in particular has been shown to be predictive of several outcomes in varying medical populations, including lower HRQOL,<sup>65</sup> higher levels of depression and anxiety, lower perceived social support,<sup>66</sup> and lower level of overall life satisfaction as well as specific domains of health, self, friends and relatives, marriage/partner relationship, and sexuality.<sup>67</sup> In a large study of 3080 cancer survivors, those with Type D Personality report lower QOL, general health, and emotional and social functioning, while also endorsing greater levels of fatigue, depression, and anxiety.<sup>68</sup> High levels of neuroticism and low levels of extraversion are also more predictive of reports of fatigue than physical impairment among individuals with MS.<sup>69</sup> Finally, in recent studies, Type D Personality has been shown to be associated with worse HRQOL, greater reports of fatigue, pain, psychological distress, and lower self-efficacy, LOC, disease management, and worse adherence.<sup>70,71</sup> Findings of the present investigation suggest that these personality traits may be predictive of lower QOL in early on in the disease process of MS. Presence of these traits may also explain the higher rates of fatigue, sleep disturbance, and pain among those with low to average QOL despite their being comparable disease duration and course.

Finally, with regard to PWB, differences were found between the two groups, particularly for self-acceptance, personal relationships, and purpose in life, and to a lesser extent, personal growth. These facets of well-being are vital to one’s health when taking the perspective that health is not just the mere absence of illness, but one’s overall outlook on life. The World Health Organization defines health as a “State of complete physical, mental,



and social well-being, and not merely the absence of disease or infirmity.”<sup>72</sup> Thus, while the symptoms and disability associated with MS are known to have a substantial impact on one’s QOL, assessment of these domains are consistently warranted to better ascertain what the “whole” patient is experiencing and to encourage more of an approach of integrating the positive aspects of PWB and perhaps less of a negative, deficit model that is more typical in the MS literature and care. Of other note is the finding that these aspects of PWB were consistent with how individuals reported their coping styles. Namely, those with high QOL reported greater levels of acceptance, use of social support, and positive reinterpretations and growth as a means of coping, while those with lower QOL reported disengaging as a means of coping.

While it is hoped that the study sheds light on the role of person-specific factors associated with QOL in early MS, there are a few limitations. Namely, in an ideal situation when assessing QOL over the course of an illness and examining pre-existing factors that may account for adjustment and QOL, we would assess individuals at the onset of the illness and follow them over time particularly as the disease progresses. However, the present study is cross-sectional and does not lend itself to any causal inferences. Additionally, although the sample was partitioned evenly on QOL, the sample size was small. However, despite the small sample size, effect sizes greater than 1.0 were found for the majority of variables investigated suggesting that these effects could only be larger in a larger sample size and that this study was likely not underpowered.

Nonetheless, the present study highlights the importance of adopting a biospsychosocial approach in MS and suggests that there are person-specific factors that may predispose individuals to have differing levels of QOL even early on in the illness. Efforts to remediate and/or strengthen these aspects of an individual appears warranted. It would be useful for care providers for those with MS to implement early assessment and intervention addressing these factors. For instance, improving self-efficacy through mastery, accomplishment, and even, vicarious experiences early on in the disease process may result in improved outcomes and a greater sense of self-management. Previous investigations have found improvements in self-efficacy following involvement in wellness programs,<sup>73</sup> cognitive behavioral interventions,<sup>74</sup> and fatigue management programs<sup>75</sup> suggesting that practitioners consider this in their recommendations and referrals for patients. Moreover, these interventions are predominantly conducted in group settings, which facilitates development of self-efficacy and also provides social support, which may also be beneficial early on in the disease process.

Identifying ways to find meaning or growth from one’s diagnosis and preventing individuals from disengaging seems imperative and stresses the importance of inquiring about how one copes with life stressors. Furthermore, practitioners should assess patients’ LOC. In particular, identifying their attributions regarding their illness and perceived control. By ascertaining what one has control over and what one does not have control over is necessary in assuring that patients are realistic and adaptive as to where they focus their energy in dealing with their MS. This can be achieved by administering questionnaires at the onset of diagnosis and throughout treatment. Assessments could include measures of coping, self-efficacy, LOC, and perceived control and management of one’s MS, including their

knowledge of MS. Practitioners should incorporate the findings from such assessments, explain to patients their role, and work with them to improve any weaknesses that may be getting in their way of living fully with MS and adjusting to their illness. The measures utilized in the present study are fairly brief and most are easily available and free to use. The inclusion of measures of PWB also stresses the importance of looking at QOL and health as much more than simply the mere absence of illness. It is hoped that these aspects of PWB are considered more often in the treatment and care of individuals with MS and that we can see a movement to the positive from the negative.

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**Table 1**

## Participant demographics

	Low to Average QOL N = 34	High QOL N = 35	t-test or Chi-Square, Significance
<b>Age</b>	40.29 (7.42)	40.57 (8.32)	$t(67) = -.146, p = .884$
<b>Gender (F/M)(%F)</b>	30F/4M (88%)	32F/3M (91%)	$\chi^2 = .193, p = .660$
<b>Education</b>	15.65 (1.98)	15.80 (1.80)	$t(67) = -.336, p = .738$
<b>Present Relationship</b>	8No/26Yes	3No/32Yes	$\chi^2 = 2.88, p = .090$
<b>Disease duration</b>	3.21 (1.38)	2.91 (1.30)	$t(67) = .920, p = .361$

*Note.* Participants were part of a larger study examining employment issues in multiple sclerosis. Participants were included in the present study if there were diagnosed with a relapsing remitting course within the past five years.

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**Table 2**

Comparisons (Independent Student's t-test) of health-related quality of life, perceived stress, perceived success, and psychological well-being between individuals with multiple sclerosis with average to low or high levels of quality of life.

	Low to Average QOL	High QOL	t-test, F-statistic, or Chi-Square, Significance	<i>d</i>
<i>Health-related QOL (SF-36)</i>				
<b>Physical Health Summary</b>	37.95 (8.41)	42.88 (7.31)	F(1,67) = -2.60, p = .011	.63
<b>Mental Health Summary</b>	38.60 (10.97)	49.88 (9.59)	F(1,67) = -4.55, p < .001	1.09
<i>Psychological well-being (Ryff PWBS)</i>				
<b>Personal Relationships</b>	54.76 (11.54)	69.37 (10.68)	F(1,67) = 29.82, p < .001	1.31
<b>Autonomy</b>	57.38 (9.05)	66.74 (9.63)	F(1,67) = 17.28, p < .001	1.00
<b>Personal Growth</b>	61.24 (11.14)	69.74 (9.80)	F(1,67) = 11.37, p = .001	.81
<b>Purpose in Life</b>	56.18 (10.00)	67.51 (7.39)	F(1,67) = 28.84, p < .001	1.29
<b>Environmental Mastery</b>	50.21 (10.18)	58.22 (12.50)	F(1,67) = 45.54, p < .001	.70
<b>Self-Acceptance</b>	49.09 (13.24)	68.00 (8.35)	F(1,67) = 50.69, p < .001	1.71
<i>Perceived Stress &amp; Success</i>				
<b>Perceived Stress Scale (PSS)</b>	22.68 (6.07)	13.63 (6.15)	F(1,67) = 37.81, p < .001	1.48
<b>Flourishing Scale (FS)</b>	40.65 (6.98)	51.29 (3.79)	F(1,67) = 62.43, p < .001	1.89

Note. QOL = Quality of life

**Table 3**

Comparisons (Independent Student's t-test) of disease symptoms, psychological functioning, personality, self-efficacy, locus of control, and social support between individuals with multiple sclerosis with average to low or high quality of life.

	Low to Average QOL	High QOL	t-test or Chi-Square, Significance	<i>d</i>
<i>Disease Symptoms</i>				
<b>Fatigue (MFIS Physical)</b>	20.79 (7.38)	13.86 (7.90)	t(67) = 3.77, p < .001	.91
<b>Sleep Disturbance (PSQI)</b>	9.35 (3.87)	6.49 (2.98)	t(67) = 3.45, p = .001	.83
<b>Pain (PES)</b>	16.56 (5.46)	11.37 (3.87)	t(67) = 4.56, p < .001	1.10
<i>Psychological Functioning</i>				
<b>Mood Symptoms (CMDI)</b>	32.26 (14.85)	17.91 (5.41)	t(67) = 5.30, p < .001	1.28
<b>Evaluative Symptoms (CMDI)</b>	26.85 (12.74)	17.09 (4.46)	t(67) = 4.23, p < .001	1.02
<b>Trait Anxiety (STAI)</b>	50.24 (10.19)	35.20 (9.96)	t(67) = 6.20, p < .001	1.49
<i>Personality (NEO-FFI)</i>				
<b>Openness</b>	28.85 (7.01)	32.00 (7.26)	t(67) = -1.83, p = .071	.44
<b>Conscientiousness</b>	31.26 (6.52)	33.94 (6.43)	t(67) = -1.72, p = .090	.41
<b>Extraversion</b>	22.91 (7.00)	31.26 (6.82)	t(67) = -5.02, p < .001	1.21
<b>Agreeableness</b>	33.44 (5.91)	35.00 (5.13)	t(67) = -1.17, p = .246	.28
<b>Neuroticism</b>	28.06 (8.61)	16.97 (8.32)	t(67) = 5.44, p < .001	1.31
<i>Self-efficacy &amp; LOC</i>				
<b>General Self-efficacy (GSE)</b>	28.91 (4.30)	32.43 (4.77)	t(67) = -3.21, p = .002	.78
<b>MS Self-efficacy (DMSES)</b>	50.00 (13.66)	62.06 (17.88)	t(67) = -3.14, p = .003	.76
<b>LOC (IPIP-LOC)</b>	65.21 (12.55)	82.17 (9.97)	t(67) = -6.23, p < .001	1.50
<i>Social Support</i>				
<b>Social Support (MSSS)</b>	14.93 (4.81)	18.44 (3.53)	t(67) = -3.46, p = .001	.75
<b>Couple Satisfaction (CSI)</b>	47.15 (25.12)	66.97 (14.04)	t(37.37) = -3.59, p = .001	.97

Note. QOL = Quality of life; LOC = Locus of Control; MS = multiple sclerosis



**Table 4**

Comparisons (Multivariate Analysis of Variance) of coping styles between individuals with multiple sclerosis with average to low or high quality of life.

	Low to Average QOL	High QOL	F-statistic, Significance	<i>d</i>
<i>COPE Inventory</i>				
<b>Behavioral disengagement</b>	7.35 (2.33)	5.80 (1.73)	F(1) = 9.90, .002	.75
<b>Mental disengagement</b>	8.97 (2.35)	8.71 (2.26)	F(1) = .21, .646	.11
<b>Venting of emotions</b>	10.06 (2.94)	8.94 (2.44)	F(1) = 2.95, .090	.41
<b>Denial</b>	6.56 (2.40)	5.54 (2.00)	F(1) = 3.65, .060	.46
<b>Suppression of activities</b>	9.15 (1.97)	9.91 (1.98)	F(1) = 2.61, .111	.38
<b>Restraint</b>	9.32 (2.20)	10.03 (2.12)	F(1) = 1.84, .180	.33
<b>Planning</b>	11.21 (2.74)	12.46 (2.06)	F(1) = 4.61, .035	.52
<b>Active coping</b>	10.62 (2.16)	12.17 (1.89)	F(1) = 10.14, .002	.76
<b>Use of instrumental social support</b>	10.29 (2.62)	12.31 (2.32)	F(1) = 11.49, .001	.82
<b>Use of emotional social support</b>	9.82 (3.24)	11.46 (2.94)	F(1) = 4.81, .032	.53
<b>Humor</b>	8.91 (3.49)	10.94 (3.10)	F(1) = 6.54, .013	.62
<b>Acceptance</b>	10.41 (2.34)	12.20 (1.78)	F(1) = 12.84, .001	.86
<b>Positive reinterpretation and growth</b>	11.38 (2.94)	13.43 (1.96)	F(1) = 11.61, .001	.82
<b>Religious coping</b>	9.97 (4.66)	8.91 (4.91)	F(1) = .84, .363	.22
<b>Substance use</b>	5.76 (3.04)	4.77 (2.06)	F(1) = 2.54, .115	.38

*Note.* QOL = Quality of life

Comprehensive forward (Wald) stepwise logistic regression quality of life in early multiple sclerosis.

**Table 5**

	<b>B</b>	<b>Exp (β)</b>	<b>Wald</b>	<b>sig.</b>	<b>Cox &amp; Snell R<sup>2</sup></b>
<i>Step 1</i>					
Locus of Control	.132	1.14	17.46	.000	.36
<i>Step 2</i>					
Locus of Control	.079	1.08	4.06	.044	
Anxiety	.093	.91	34.16	.041	.40