Well-Being and Perceived Health in Multiple Sclerosis (MS): The Role of Personality

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Abstract

Objectives: Personality is known to have a substantial impact on health and overall well-being. Neuroticism, extraversion, and conscientiousness in particular have been shown to be strongly correlated with subjective well-being (SWB), psychological well-being (PWB), and overall health. The present study aimed to examine the role of personality and its relationship to SWB, PWB, and health in a multiple sclerosis (MS) sample.

Methods: One hundred and seventy-two individuals with MS completed measures of personality, SWB, PWB, and health. Pearson correlations were conducted to examine the relationship among these factors.

Results: Consistent with what has been shown in the general, healthy population personality has a strong correlation with many aspects of well-being and health. This was particularly true for neuroticism and extraversion, and to a lesser extent, conscientiousness. Openness and agreeableness demonstrated the weakest associations.

Conclusion: The role of personality on well-being and health has long been established. The present study is one of the first to examine these associations in a MS sample. Findings suggest that assessment of personality should be considered part of routine care for individuals with MS in hopes of tailoring interventions to assure maintenance and/or improvement in well-being and health.

Keywords: Multiple sclerosis; Quality of life (QOL); Personality; Well-being; Health

Introduction

Multiple sclerosis (MS) is a variable, unpredictable chronic illness that is known to impact overall quality of life (QOL) and well-being. Symptoms include difficulties or changes in gait, tremors, visual problems, bladder/bowel incontinence, numbness/tingling in extremities, pain, spasticity, abnormal somatic sensations, sexual dysfunction, and speech disturbances [1]. Secondary symptoms include fatigue, depression, sleep disturbance, and cognitive disturbance, which occur at extremely high rates and are known to significantly contribute to reductions in well-being and QOL MS.

In order to fully appreciate the impact of MS on well-being and QOL, one must consider the characteristics of those diagnosed and the nature of the illness and prognosis. Multiple sclerosis is typically diagnosed between the ages of 20 and 50, with a median age of 33 years old and affects women twice to three times as often as men [2]. Thus, individuals are high functioning, relatively young, who are stricken with a disease that has an uncertain cause, and to the best of our knowledge, no cure in the imminent future. Such a diagnosis may seem catastrophic to most. In fact, it has been shown that men and women with MS aged 25-44 reported significantly higher rates of depression (13% and 22%, respectively) compared to their healthy aged counterparts (5% and 11%, respectively) [3]. Such findings suggest that individuals with MS in this period in life experience greater depression, which may be accountable to the interruption and uncertainty MS brings at that stage of life.

Provided this, a great amount of attention has been paid to depression and anxiety in MS. Again, depression is extremely common in MS with a lifetime prevalence of major depression around 50% and point prevalence rates varying between about 15-50% [4-7]. Anxiety is present in about 25% of patients at any given time, with lifetime prevalence estimates around 35% [8]. These aspects of well-being can be characterized as subjective well-being (SWB), which is typically construed as happiness (balance of positive and negative affect) and life satisfaction. Most attention has been given to this aspect of well-being in MS. Psychological well-being (PWB) or eudaimonic happiness

has received far less attention. Psychological well-being 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 [9]. These concepts provide a much fuller picture of an individual and their overall well-being. Again, to date the focus among individuals with MS has been primarily on SWB. What is less often asked is, "What about the people who despite their MS seem to maintain a degree of psychological well-being?" or "How is that some individuals find purpose or meaning in regard to their MS diagnosis?" These questions are often raised by clinicians in attempting to understand why certain individuals who are faced with such adversity seem to come through to the other side with greater meaning, purpose, or happiness and possibly even, greater health.

Ryff et al. describe that the "route to advancing health, construed as the presence of wellness, is to focus on what it means to flourish, such as having a sense of purpose and direction in life, good quality relationships with others, and opportunities to realize one's potential" (pp: 1383) [10]. Folkman et al. aimed to merge what is observed clinically to theory and research and proposed a model to explain the existence of "happiness" in despairing situations such as an illness [11]. They propose that there are certain pre-existing, dispositional attributes of an individual (e.g. personality), situational efficacy beliefs (e.g. self-efficacy, hope), and coping processes that lead to the development and maintenance of psychological well-being among individuals, even in the face of illness. In the present paper, we focus on the former, personality and its relationship to SWB, PWB and health in a MS sample.

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The relationship between personality and SWB has been well established. Early contentions in the 1960s suggested that there was a certain "avowed happiness" that individuals possessed. Such individuals were described as "extraverted, optimistic and worry-free" (p. 294) [12]. In fact, extraversion and neuroticism have been shown to have the most significant and consistent correlations with SWB. More specifically, in a meta-analysis, the correlation between extraversion and positive affect averaged around 0.35, while greater associations were found with neuroticism and negative affect, averaging about 0.52 [13]. A similar meta-analytic review found an average correlation of 0.20 for extraversion and positive affect and a correlation of 0.23 for neuroticism and negative affect. Both were associated with happiness nearly equally (0.27 for extraversion and -0.25 for neuroticism) [14]. Associations with the other Big Five personality traits (Openness, Agreeableness, and Conscientiousness) demonstrate weaker relationships; leading some to view neuroticism and extraversion as the only ones that matter when it comes to SWB.

The relationship between personality and PWB yields similar results as SWB. In particular, the strongest relationship has been found for neuroticism. In particular, when utilizing the Ryff Scales of Psychological Well-Being, Schmutte and Ryff found neuroticism to be strongly and inversely related to environmental mastery and self-acceptance (Table 1, Reproduced from Schmutte and Ryff). Conscientiousness was found to have the second strongest association with PWB, followed by extraversion. Agreeableness was shown to have its' strongest association with personal relationships, while openness was moderately correlated with personal growth [15].

With regard to health, personality has long been used to explain individual differences in health. For instance, neuroticism has been shown to be associated with greater mental and physical health problems [16], increased somatization and reports of pain [17] and cause of earlier mortality [18]. In contrast, conscientiousness has been associated with greater self-rated health, decreased frequency of physical limitations among those with a physical illness, and lower mortality risk [16,19]. Recently, Zarbo et al. found that among individuals with MS, those who were introverted and had high levels of neuroticism endorsed lower levels physical and mental health, suggesting that beyond the disease itself, personality can also contribute to one's perceived health [20]. This author has found similar findings in which individuals with MS who endorse personality characteristics akin to a "Type D Personality," also report greater levels of fatigue, pain, depression, and anxiety and worse disease management and adherence [21].

Given what is known in regard to personality and its role on SWB, PWB, and health, the present investigation sought to examine these relationships among a sample of individuals with MS to better determine if there are intrinsic, pre-existing traits that may predispose an individual to differing trajectories of well-being and health, despite their MS.

	O	C	E	A	N
Personal Relationships	0.06	0.38**	**0.44****	**0.52****	-0.45
Autonomy	0.17*	0.39**	0.24**	0.14*	-0.48
Personal Growth	**0.42****	0.31**	0.43**	0.32**	-0.20
Purpose in Life	0.16*	**0.54****	0.38**	0.28**	-0.54
Environmental Mastery	0.04	**0.67****	0.31**	0.35**	**-0.70**
Self-Acceptance	0.03	**0.52****	0.43**	0.37**	**-0.70**

Note: O=Openness; C=Conscientiousness; E=Extraversion; A=Agreeableness; N=Neuroticism; *0.001<p<0.05, **p<0.001. Reproduced from Schmutte et al. [15] Personality Processes and Individual Differences

Table 1: Previously identified correlations between personality and psychological well-being.

Methods

Participants

All participants were diagnosed with clinically definite MS as verified by their neurologist and had enrolled in a prospective, longitudinal investigation examining the disease and person-specific factors associated with employment status in MS. Eligibility criteria included age ranging from 20 to 64 and absence of other neurological disorders.

Methods

All participants completed an online survey consisting of questionnaires assessing personality, SWB (i.e., depression, anxiety and life satisfaction), PWB, and general and health-related QOL. All study procedures were approved by the Institutional Review Board. Informed consent was obtained from all participants.

Measures

Personality was assessed with the NEO-Five Factor Inventory-3 (NEO-FFI-3) [22], which is based on the five factor model of personality and includes subscales of Openness, Conscientiousness, Extraversion, Agreeableness and Neuroticism. Depression was assessed by the Chicago Multiscale Depression Inventory (CMDI) [23], a self-report measure that was specifically designed to assess depression in MS and other medically-ill groups. It consists of three subscales: Evaluative, Mood and Vegetative. For the purposes of the present investigation, the mood scale was used as the measure of depressed mood as it is not influenced by neurovegetative symptoms of MS. Anxiety was measured by the State Trait Anxiety Inventory (STAI) [24]. The STAI allows the assessment of both state and trait anxiety. The trait anxiety subscale was used in the present investigation. Finally, the Satisfaction with Life Scale (SWLS) [25], a brief (5 items) measure of subjective well-being was utilized to assess one's overall satisfaction with life. The Ryff scales of psychological well-being were administered to assess overall PWB [9]. The Ryff PWB Scales consists of six subscales. The Positive Relationships subscale assesses the depth of connection an individual feels with others. The Purpose in Life subscale measures how one feels regarding their life's meaning and purpose and direction in life. How one feels they are living their life in accordance with their own convictions is assessed by the Autonomy subscale. The Self-acceptance subscale assesses one's knowledge and acceptance of themselves and their limitations. The extent to which individuals feel they are living to their full potential and taking advantage of their talents is rated by the Personal Growth subscale. Finally, the Environmental Mastery subscale measures how well an individual feels they can manage life situations. Participants also completed the Flourishing Scale (FS) [26], a brief (8 items) measure of psychological well-being that assesses one's success with regard to their self-esteem, purpose, optimism, and relationships. Finally, the Short Form-36 (SF-36) [27] was used to assess one's overall health-related quality of life. The SF-36 consists of eight subscales: General health, physical functioning, role limitations due to physical problems, bodily pain, vitality, social functioning, role-limitations due to emotional problems, and mental health.

Statistical analyses

All statistical analyses were conducted using SPSS version 21.0. Pearson correlations were conducted to explore the relationships among personality, SWB, PWB, and health-related QOL, while controlling for disease duration.

Results

A total of 172 individuals with MS (90% Female and 95% with a

relapsing-remitting course) were enrolled in the study. The mean age was 44 years (Range=25-64) and mean education approached a college education (M=15.74 (2.20); Range=9-20). The majority had a relapsing-remitting course (95%) and mean disease duration was approximately eight years (Table 2).

Findings suggest that personality has significant associations with SWB, PWB and health among individuals with MS that are consistent with what is found in the general population.

With regard to SWB, neuroticism had the most significant correlation with depression (r=0.75), anxiety (r=0.90), and life satisfaction (r=-0.51). Extraversion was the second most related to SWB (depression, r=-0.43; anxiety, r=-0.50; life satisfaction, r=0.33). After these two traits, conscientiousness demonstrated the greatest association with SWB. Finally, as expected, openness and agreeableness showed the weakest correlations with SWB (Table 3).

When examining the relationship between PWB and personality, neuroticism was found to be inversely related to all aspects of PWB with the following correlations: Personal relationships (r=-0.57), autonomy (r=-0.47), personal growth (r=-0.41), and purpose in life (r=-0.64). The greatest correlations were found with environmental mastery (r=-0.76) and self-acceptance (r=-0.77). In contrast, PWB was significantly, positively correlated with the remaining personality traits with the largest associations being found for Extraversion and Conscientiousness, and to a lesser extent, Openness and Agreeableness. In particular, the association between Extraversion and PWB was, on average, 0.50 with all aspects of PWB. Extraversion was related least to autonomy (r=0.22) but moderately to purpose in life (r=0.58) and personal growth (r=0.57), personal relationships (r=0.56), environmental mastery (r=0.54) and self-acceptance (r=0.54). Not surprising, conscientiousness was most strongly related to environmental mastery (r=0.61). Its association with purpose in life (r=0.54) and self-acceptance (r=0.48) were also moderate. Lower correlations were found with personal growth (r=0.36), personal relationships (r=0.34), and autonomy (r=0.26). Openness, on the other hand, was most associated with personal growth (r=0.51), which is consistent with the definition of openness, more generally. Openness was also correlated with purpose in life (r=0.31), self-acceptance (r=0.25), personal relationships (r=0.23), autonomy (r=0.20) and environmental mastery (r=0.14). Finally, agreeableness, which tends to have the least consistent correlation with PWB was significantly related to personal relationships (r=0.50), personal growth

	O	C	E	A	N
Personal Relationships	0.23**	0.34**	**0.56**	**0.50**	-0.57
Autonomy	0.2°	0.26**	0.22*	0.17*	-0.47
Personal Growth	**0.51**	0.36**	**0.57**	0.35**	-0.41
Purpose in Life	0.31**	**0.54**	**0.58**	0.33**	**-0.64**
Environmental Mastery	0.14*	**0.61**	**0.54**	0.29**	**-0.76**
Self-Acceptance	0.25**	0.48**	**0.54**	0.29**	**-0.77**
Flourishing Scale	0.26**	0.33**	**0.55**	0.30**	-0.55

Note: O=Openness; C=Conscientiousness; E=Extraversion; A=Agreeableness; N=Neuroticism; *p<0.05, **p<0.01

Table 4: Correlations between personality and psychological well-being in a MS sample, controlling for disease duration.

	O	C	E	A	N
General Health	0.1	0.21*	0.38**	0.13	-.35**
Physical Functioning	0.11	-0.01	0.26**	-0.05	-0.1
Role Physical Functioning	-0.12	0.29**	0.21**	0.07	-0.31**
Role Emotional Functioning	-0.11	0.31**	0.26**	0.11	-0.50**
Social Functioning	0.08	0.26**	0.39**	0.17*	**-0.54**
Mental Health	0.12	**0.34**	**0.51**	**0.26**	**-0.81**
Vitality	0.13	0.24**	**0.47**	0.01	-0.46**
Bodily Pain	-0.04	0.15*	0.28**	0.02	-0.31**

Note: **Significant at the 0.01 level, *Significant at the 0.05 level

Table 5: Correlations among personality and general and health-related quality of life, controlling for disease duration.

(r=0.35), purpose in life (r=0.33), environmental mastery (r=0.29), self-acceptance (r=0.29) and autonomy (r=0.17) (Table 4).

Personality traits were also found to be related to health-related QOL as measured by the SF-36 (Table 5). Not surprising, the strongest associations were found with neuroticism and extraversion. The strongest correlations with neuroticism were found with mental health (r=-0.81), social functioning (r=-0.54), role emotional functioning (r=-0.50) and vitality (r=-0.46). Role physical functioning and pain were also correlated with neuroticism (r's=-0.31). Extraversion was associated moderately with mental health (r=0.51), vitality (r=0.47), social functioning (r=0.39) and general health (r=0.38). Lower, but significant correlations were found with pain (r=0.28), role emotional functioning (r=0.26), physical functioning (r=0.26) and role physical functioning (r=0.21). Conscientiousness was correlated highest with mental health (r=0.34), role physical functioning (r=0.29) and role emotional functioning (r=0.31). Following this was social functioning (r=0.26), vitality (r=0.24) and general health (r=0.21). No association was found for physical functioning. Agreeableness demonstrated some association with mental health (r=0.26) and social functioning (r=0.17). No other associations were found. Finally, openness was not found to be related to any aspects of health-related QOL in this sample.

Discussion

Personality has long been hailed as a significant predictor of well-being and health, particularly neuroticism and extraversion. We sought we examine the role of personality on SWB, PWB, and health among individuals with a chronic, variable, and uncertain disease such as MS.

Present findings are consistent with what has been shown in the general population and suggests that greater attention to personality is warranted when determining the overall health and well-being of those with MS. More specifically, even when controlling for disease duration, higher levels of neuroticism was most associated with poor mental health on the SF-36 and greater depression and anxiety. Individuals also endorsed lower levels of self-acceptance, environmental mastery,

	Mean (SD) or Frequency
Age	44.10 (9.50)
Education	15.74 (2.20)
Gender	155F/17M (90.2% Female)
Disease Course	163RR/5PP/3SP/1PR
Disease Duration	8.40 (6.62)

Note: RR=Relapsing Remitting; PP=Primary Progressive; SP=Secondary Progressive; PR=Progressive Relapsing

Table 2: Participant demographics.

	O	C	E	A	N
Depression	---	-0.31**	-0.43**	-0.24*	**0.75**
Anxiety	---	-0.43**	-0.50**	-0.30**	**0.90**
Life Satisfaction	---	0.29**	0.33**	---	-0.51**

Note: Depression=Chicago Multiscale Depression Inventory Mood Scale; Anxiety-State Trait Anxiety Scale-Trait Anxiety; Life satisfaction-Satisfaction with Life Scale; **Significant at the .01 level, *Significant at the 0.05 level

Table 3: Correlations between personality and subjective well-being controlling for disease duration.

and overall purpose in life. There was also an association with worse perceived personal relationships and social functioning. The latter is relevant given that depression in MS has been purported to be, in part, due to perceived limited social support and may be an artifact of increased neuroticism, which is already associated with an inclination to experience negative emotions such as depression and worry.

Extraversion, on the other hand was moderately associated with more positive aspects of well-being and health including, greater personal relationships and personal growth, purpose in life, environmental mastery, self-acceptance, vitality, and mental health. In general, extraversion has been touted as the "runner up" after neuroticism in understanding the role of personality on well-being [28]. Present findings would seem to confer this suggestion. Again, given the known role of perceived social support on depression in MS as well as the known association of healthy relationships on well-being and health, in general, individuals with such traits may be more capable of maintaining a good social support network and more likely to report greater overall well-being. Assessment of a patient's social network and, more importantly the ease and quality of their relationships should be considered when treating the "whole" person and perhaps intervention is needed when this is more of a struggle for them or is not as "natural." Conscientiousness was also shown to have some fairly modest relationships with environmental mastery and purpose in life. Such finding is consistent with the features of a conscientious person, which is to be fairly goal driven, purposeful, efficient, disciplined, and orderly. It was surprising that there were not greater correlations with perceived health given the known role of conscientiousness on perceived and actual health, but that may be an artifact of the SF-36, which seems to assess more of the impact of the illness and health and less on objective health and related health behaviors, which are strongly correlated with conscientiousness. Finally, while agreeableness and openness did not demonstrate much of an association with well-being and health, in general, openness was found to be significantly correlated with personal growth. This finding seems fairly intuitive as openness is, by its definition, "openness to experience" and in part describes the inclination for one to pursue new experiences and have an intellectual curiosity. As such, one's sense of personal growth can be a consequence of their being more open and receptive to the world around them.

While present findings are not necessarily novel, this study was the first to specifically examine the association of personality and SWB, PWB, and perceived health in MS, while taking into account the duration of their illness. Duration of illness has been shown to have a negative [29] and positive effect on QOL [30] suggesting a bimodal distribution with an initial period following diagnosis and greater disability later on in the illness having the greatest impact on QOL. Most recently, Fanciullacci et al. suggested that QOL among individuals with MS is not related to disease duration at all [31]. The importance of such is that while there are certain disease-related variables that are known to substantially impact one's quality of life with MS, there are pre-existing characteristics of a person that are also worthy of attention when caring for and treating individuals with MS in hopes of attaining the most optimal outcomes and assuring maintenance of quality of life. Personality is one such factor. Thus, assessment of one's personality, specifically at time of diagnosis may assist in identifying certain personality traits that may result in worse perceived health and/or well-being and inform potential interventions. For instance, cognitive behavioral therapy for those with high levels of neuroticism, which is aimed at modifying one's negative perceptions and evaluations, may ward off further decline in well-being or health. Additionally, for those who describe themselves as being more of an introvert, identification of support groups or other planned social activities for those may have a substantial impact for them and be less

needed for those who already report an ease and quality in relationships. Finally, given the more recent attention to mindfulness and interventions aimed at improving such, assessment of one's personality can identify for whom these interventions will most benefit and who are more innately inclined to be mindful. Mindfulness, in general is mostly related to neuroticism [32]. It has been shown that individuals with MS that report being more mindful also report greater well-being, better coping skills, and higher QOL [33]. Thus, tailored intervention based on more on one's personality and tendencies seems warranted. Assessment of personality can easily be achieved via brief and free measures such as the Ten Item Personality Inventory (TIPI) and readily integrated into routine care in hopes of better achieving such a goal.

Conclusion

It is hoped that the study sheds light on the role of personality in MS, there is one limitation that hinders the enthusiasm for the study findings. Namely, in an ideal situation assessment of personality before one's diagnosis or immediately at the onset and subsequent follow-up would allow for a more accurate assessment in predicting how one's premorbid personality affects their well-being and health over time. Further longitudinal studies are thus needed in order to better develop causation. However, given the fairly stable nature of personality, particularly among the age of the participants in this sample, the findings remain quite meaningful and suggest that pre-existing personality is a large part in defining how an individual will see their life, as well as their diagnosis and future with MS.

References

1. Smith CR, Samkoff LM, Scheinberg LC (1993) Clinical features, assessment and differential diagnosis of multiple sclerosis. Mult scler 14: 1157-1174.

2. Shnek ZM, Foley FW, LaRocca NG, Smith CR, Halper J (1995) Psychological predictors of depression in multiple sclerosis. Neurorehabilitation and Neural Repair 9: 15-23.

3. Patten SB, Svenson LW, Metz LM (2005) Descriptive epidemiology of affective disorders in multiple sclerosis. CNS spectr 10: 365-371.

4. Chwastiak L, Ehde DM, Gibbons LE, Sullivan M, Bowen JD, et al. (2002) Depressive symptoms and severity of illness in multiple sclerosis: epidemiologic study of a large community sample. Am J Psychiatry 159: 6.

5. McGuigan C, Hutchinson M (2006) Unrecognised symptoms of depression in a community-based population with multiple sclerosis. J Neurol 253: 219-223.

6. Cetin K, Johnson KL, Ehde DM, Kuehn CM, Amtmann D, et al. (2007) Antidepressant use in multiple sclerosis: Epidemiologic study of a large community sample. Mult Scler 13: 1046-1053.

7. Siegert RJ, Abernethy DA (2005) Depression in multiple sclerosis: A review. J Neurol Neurosurg Psychiatry 76: 469-475.

8. Korostil M, Feinstein A (2007) Anxiety disorders and their clinical correlates in multiple sclerosis patients. Mult Scler 1: 67-72.

9. Ryff CD, Keyes CL (1995) The structure of psychological well-being revisited. J Pers Soc Psychol 69: 719-727.

10. Ryff CD, Singer BH, Love GD (2004) Positive health: Connecting well-being with biology. Philos Trans R Soc Lond B Biol Sci 359: 1383-1394.

11. Folkman S, Greer S (2000) Promoting psychological well-being in the face of serious illness: when theory, research and practice inform each other. Psychooncology 9: 11-9.

12. Wilson W (1967) Correlates of avowed happiness. Psychol Bull 67: 294-306.

13. Steel P, Schmidt J, Shultz J (2008) Refining the relationship between personality and subjective well-being. Psychol bull 134: 138.

14. DeNeve KM, Cooper H (1998) The happy personality: A meta-analysis of 137 personality traits and subjective well-being. Psychol Bull 124: 197-229.

15. Schmutte PS, Ryff CD (1997) Personality and well-being: Reexamining methods and meanings. J Pers Soc Psychol 73: 549-559.

16. Kern ML, Friedman HS, Martin LR, Reynolds CA, Luong G (2009)

Conscientiousness, career success and longevity: A lifespan analysis. Ann Behav Med 37: 154-63.

17. Russo J, Katon W, Lin E, Von Korff M, Bush T, Simon G, et al. (1997) Neuroticism and extraversion as predictors of health outcomes in depressed primary care patients. Psychosomatics 38: 339-348.

18. Lahey BB (2009) Public health significance of neuroticism. Am Psychol 64: 241-256.

19. Goodwin RD, Friedman HS (2006) Health status and the five-factor personality traits in a nationally representative sample. J Health Psychol 11: 643-654.

20. Zarbo IR, Minacapelli E, Falautano M, Demontis S, Carpentras G, et al. (2016) Personality traits predict perceived health-related quality of life in persons with multiple sclerosis. Mult Scler 22: 551-558.

21. Strober L (2016) Personality in multiple sclerosis (MS): Impact on health, psychological well-being, coping and overall quality of life. Psychol Health Med 2016: 1-10.

22. Costa PT, McCrae RR (1992) Neo PI-R professional manual.

23. Nyenhuis DL, Luchetta T (1998) The development, standardization, and initial validation of the Chicago Multiscale Depression Inventory. J Pers Assess 70: 386-401.

24. Spielberger CD, Gorsuch RL (1983) State-trait anxiety inventory for adults: Manual, instrument and scoring guide: Mind Garden Incorporated.

25. Diener E, Emmons RA, Larsen RJ, Griffin S (1985) The satisfaction with life scale. J Pers Assess 49: 71-75.

26. Diener E, Wirtz D, Tov W, Kim-Prieto C, Choi D-w, et al. (2010) New well-being measures: Short scales to assess flourishing and positive and negative feelings. Social Indicators Research 97: 143-156.

27. Ware JE, Keller SD, Kosinski M (1994) SF-36: Physical and mental health summary scales: A user's manual: Health Assessment Lab 4.

28. DeNeve KM (1999) Happy as an extraverted clam? The role of personality for subjective well-being. Curr Dir Psychol Sci 8: 141-144.

29. Benito-Leon J, Morales JM, Rivera-Navarro J (2002) Health-related quality of life and its relationship to cognitive and emotional functioning in multiple sclerosis patients. Eur J Neurol 9: 497-502.

30. Schwartz C, Frohner, R (2005) Contribution of demographic, medical and social support variables in predicting the mental health dimension of quality of life among people with multiple sclerosis. Health Soc Work 30: 203-212.

31. Fanciullacci C, Straudi S, Basaglia N, Chisari C (2017) The role of psychological well-being in multiple sclerosis rehabilitation. Eur J Phys Rehabil Med 53: 105-113.

32. Giluk TL (2009) Mindfulness, big five personality, and affect: A meta-analysis. Pers Individ Diff 47: 805-811.

33. Senders A, Bourdette D, Hanes D, Yadav V, Shinto L (2014) Perceived stress in multiple sclerosis: The potential role of mindfulness in health and well-being. J Evid Based Complement Altern Med 19: 104-111.