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Original Article

The Mediating Role of Psychological Capital in the Relationship between Self-Management and Nutrition Behavior in People with Multiple Sclerosis

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A B S T R A C T

Background: The aim of this study was to investigate the direct and indirect effects of self-management on Nutrition Behavior (NB) with the mediating role of Psychological Capital (PC) in People with Multiple Sclerosis (PwMS) in Gilan province.

Methods: We studied PwMS in Guilan MS Society (GMSS) in a cross-sectional design research in 2019. We invited 275 PwMS to participate in the study either through convenience sampling method. Data collection tool consisted of questions about demographic characteristics of participants, a revised form of Multiple Sclerosis Self-Management Scale (MSSM-R), Psychological Capital Questionnaire (PCQ), and Health-Promoting Lifestyle Profile II (HPLP-II). Data were analyzed using Pearson correlation coefficient and Structural Equation Modeling (SEM) in SPSS 19.0 and Amos 18.0 statistical software.

Results: The results showed that nutrition has a significant positive correlation with self-management ($r = 0.342$), self-efficacy ($r = 0.211$), optimism ($r = 0.208$), hope ($r = 0.316$), resiliency ($r = 0.237$), and PC ($r = 0.287$) (P-value < 0.001). Additionally, the results showed that the direct and indirect effect of self-management on nutrition was significant and the proposed model had a good data fitting. The VAF index showed that 18% of the total effect of self-management on nutrition behavior is indirectly explained by the mediating variable of psychological capital.

Conclusion: Self- management and PC were associated with NB in PwMS. The results of this study support the importance of these factors in health-promoting behaviors with regard to NB and the proposed model can be a suitable option in health care and nursing provided that, the fit of this model is investigated in future research and other provinces.

Keywords: Multiple sclerosis, Nutrition, Self-management, Psychological capital

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Introduction

Multiple sclerosis (MS), as a chronic disease of Central Nervous System (CNS), is a disease with inflammatory and neurodegenerative components. Symptoms such as loss of vision, weakness, numbness, walking difficulty, and intestine are due to episodes reflecting inflammatory

demyelinating trauma in the optic nerves, brain, and spinal cord (1). Some studies showed that lifestyle amendments such as dietary intake have been amicable to mitigate the impact of these symptoms (2). Accordingly, fostering engagement in healthy behaviors (e.g. physical activity and nourishment) is essential to prevent the development of comorbid conditions.

Nutrition Behavior (NB) plays an important role in selecting a healthy life style. NB is a set of customs, ideas, and thoughts affecting the way of using available food sources. These differences exist in the area of meals, type of cooking, food storage, and the choice of diet type (4). Research studies have shown that the proper diet, especially if started in the early stage of life, slows the progression of the disease and the extent of long-term disability (5).

PwMS, as healthy people should follow a healthy diet because the protective function of given dietary patterns on quality of life, disability, and relapse rate has been shown in studies (6). Dietary habits reducing MS symptoms may be thought out as a supplementary treatment of MS. Further knowledge of the impacts of adverse dietary habits might help prevent chronic states in inflammation and worsening of disease (7).

Moreover, previous studies indicate that NB is regarded as an effective factor in reducing relapse rates in PwMS (6). Accordingly, MS management through NB improvement plays an effective role in reducing relapse rate and disease symptoms. In almost all chronic diseases, patients play an important role in self-management of the disease. Managing medication, roles, and emotions are among the three major tasks of self-management. Medical management are included taking medication, following a special diet, using medical services as well as altering the lifestyle including sleep, health, and exercise (8).

Additionally, the results of previous research show that psychological factors such as social support (9), self-efficacy, and health locus of control (10) have a relationship with NB. When the disease symptoms appear and relapse, the positive psychological factors and psychological capital in PwMS diminish (11). In addition, the psychological disorders such as depression and anxiety are more common in these individuals. Accordingly, the investigation of the role of psychological factors in predicting health-promoting behaviors in PwMS is of paramount importance. Moreover, various studies have shown that the rate of perceived stress in PwMS is higher in normal people (12). Adverse emotions including anger, fear and sadness are followed by irregular eating patterns which are formed as a result of distraction to rest. Stress leads to excessive intake of fatty and high carbohydrate foods, with a high rate among women. Women are more amenable to eating-related stress than men (13).

Therefore, as MS is more common in women (1), the investigation of the role of PC in NB seems to be of significant importance. The investigation of epidemiological studies shows that MS is common in Iran. The prevalence of MS in Guilan Province (GP), is estimated to be approximately 33.7 patients per 100,000 population (14); Considering that self-management behaviors and PC have been introduced as the most important factors in health-promoting behaviors, it is necessary to investigate the role of these factors in predicting NB in a single study. therefore, this study aimed to investigate the direct and indirect effect of self-management on NB with the mediating role of PC.

Methods

This research was conducted using a cross-sectional design on MS patients registered at Guilan MS Society (GMSS) during January to June, 2019. The number of members was 1700 according to the GMSS report. All of the individuals signed the informed consent form approved by National Research Ethics Committees (NREC). This study is registered in the NREC website and we always followed its instructions about the legal regulations on data confidentiality and moral rights of the participants.

Sample

Out of 1700 patients registered at GMSS, 275 PwMS were selected using a convenience sampling method. In order to conduct research, an invitation was sent to all members of MS by SMS message and they were asked to participate in this research. They were told that they can either refer to one of the mentioned therapeutic centers in person to complete the questionnaires or they can receive the questionnaires by post and complete them. In order to encourage people to participate in the research, a free consultancy session on healthy diet was considered. A total number of 205 cases (78.84%) of the questionnaires were distributed in medical centers in-person. The demographic characteristics of the participants are presented in the following.

Measurement Tools

In this study, revised form of Multiple Sclerosis Self-Management Scale (MSSM-R), Psychological Capital Questionnaire (PCQ), and Health-Promoting Lifestyle Profile II (HPLP-II) were used to collect data. Additionally, a checklist was used, in order to gather demographic characteristics. These characteristics included: age, gender, educational level, and diseases duration.

MSSM-R was 24-item scale designed by Bishop and Frain (15). The questionnaire was scored on a 5-point Likert scale (1 = strongly disagree, 2 = somewhat disagree, 3 = neither agree nor disagree, 4 = somewhat disagree, 5 = strongly agree). The greater score, indicates higher level of self-management. The range of score in this instrument was between 24 and 120. The results of the structural validity showed that this instrument was significantly negatively correlated with Multiple Sclerosis Impact Scale, and significantly positively correlated with Multiple Sclerosis Self-Efficacy scale, indicating the divergent and convergent validity of this instrument (15). The Persian version of MSSM-R has been shown to have adequate reliability and validity (14). The internal consistency for this scale based on Cronbach's alpha was 0.78.

In order to measure psychological factors, PCQ was used. This 24-item questionnaire was designed by Luthans et al., (16). This questionnaire was scored on a 6-point Likert scale (1 = completely disagree, 2 = disagree, 3 = somewhat disagree, 4 = somewhat agree, 5 = agree, and 6 = completely agree). The questionnaire has 4 constructs including self-efficacy (, hope, resiliency, and optimism. The total score ranged from 24 to 144.

Table 1. Descriptive Indices and Pearson Correlation Coefficients between Variables

Factors	Mean (SD)	Skewness	Kurtosis	Min-Max of attainable score	1	2	3	4	5	6	7
1. Nutrition	18.95 (4.61)	.227	-1.02	12-28	-						
2. Self-management	79.21 (9.78)	-.148	1.02	50-21	0.342*	-					
3. Self-efficacy	26.68 (5.80)	-.629	.266	9-36	0.211*	0.232*	-				
4. Optimism	24.84 (5.09)	-.488	.280	8-36	0.208*	0.260*	0.677*	-			
5. Hope	24.85 (6.14)	-.480	-.221	8-36	0.316*	0.217*	0.670*	0.663*	-		
6. Resilience	22.95 (5.01)	-.024	-.170	10-36	0.237*	0.209*	0.577*	0.644*	0.611*	-	
7. Psychological Capital	99.32 (18.85)	-.486	.186	36-144	0.287*	0.268*	0.862*	0.865*	0.873*	0.816*	-

SD, Standard deviation, *. Correlation is significant at the 0.01 level

The validity of the questionnaire was confirmed by exploratory factor analysis and four factors were extracted (16). The Persian version of PCQ has been shown to have good psychometric properties (17). The internal consistency for this scale in current research estimates 0.73 Cronbach's alpha.

HPLP-II was used to measure nutrition. This profile was designed and validated by Walker et al (18). HPLP-II included 52 items and 6 subscales: spiritual growth, health responsibility, interpersonal relations, stress management, physical activity, and nutrition. It uses a four-point response scale that indicates respondents' frequency of engaging in each behavior. Items were scored on 4-point scale (1 = never, 2 = sometime, 3 = often, and 4 = routinely). The greater score indicates higher level of health behavior. The range of score was between 52 and 208. The Persian version of HPLP-II has been shown to have good psychometric properties (20). In this study, only nutrition subscale was implemented. The internal consistency for this subscale based on Cronbach's alpha was 0.79.

Statistical Analysis
Normal distribution was evaluated using The Kolmogorov-Smirnov test. Pearson correlation coefficient and Structural Equation Modeling (SEM) tests were used to investigate the relationships between variables. Chi-Square, Root Mean Square Error of Approximation (RMSEA), Chi-Square/ degrees of freedom ($\chi2$ / DF), Normed Fit Index (NFI), Incremental Fit Index (IFI), Comparative Fit Index (CFI), Parsimonious Normed Fit Index (PNFI), and Parsimonious Comparative Fit Index (PCFI) were used to evaluate the fitness of the structural equation model. The level of significance was set at 0.05. statistical analyses were performed using IBM SPSS Statistics for Windows, Version 19.0 (IBM Corp., Armonk, NY, USA) and IBM SPSS AMOS version 19.0 (IBM Corp., Armonk, NY, USA).

Results
Of total, 243 participants (88.36%) completed the distributed questionnaires. There was no significant difference between respondents and non-respondents in terms of age, gender, educational level, and diseases duration. The mean age of the participants was 42.61 (SD = 10.73) years and 187 subjects (76.95%) were female.

Forty-five participants (18.51%) had diploma, 172 participants (70.78%) had a bachelor degree, and 26 participants (10.69%) had a master degree and higher. Table 1 shows descriptive findings of nutrition, Self-Management Scale and domains of Psychological Capital scale and correlation coefficients between variables.

The findings indicate that there is a positive and significant correlation between self-management, PC, and nutrition (P-value < 0.001). The findings of the descriptive statistics show that the mean score of nutrition, self-management, and PC is equal to 18.95, 79.21, and 99.22, respectively. In order to test the normality of data distribution, the skewness and kurtosis indicators were used. The result of normality indices indicate that all three variables are normally distributed in terms of skewness and normally stretched in terms of kurtosis.

Path Analysis
The adequacy and fitness of the models were investigated before testing the hypotheses and investigating the relationships between the research variables. In the present study, two models were studied and assessed in order to investigate the assumed relationships between the variables. In the first model, the role of each of the subscales of PC (self-efficacy, optimism, hope and resiliency) and in the second model, the role of PC as a structure was assessed. The results of model adequacy are presented in Table 2.

The goodness of fit (GOF) results of model 1 showed that CFI, IFI, and NFI are smaller than 0.90. Moreover, PNFI and PCFI are smaller than 0.5; RMSEA is greater than 0.8; significance level is smaller than 0.05, and χ^2/DF is greater than 3. According to these findings, considering each subscale of PC as a mediator variable was not confirmed.

While the GOF results of model 2 fit showed that CFI, IFI and NFI are greater than 0.90. Additionally, PNFI and PCFI are greater than 0.5; RMSEA is less than 0.8; P-value is greater than 0.05, and χ^2/DF is less than 3. One of the reasons why model 1 does not have a good fit seems to be the high correlation between the errors of PC subscales. Therefore, PC had better to be considered as a structure in investigating the assumed relationships between variables. Therefore, in the following, the relationships between the variables are reported based on the approved model (Model 2).

Table 2. Model Fitness Indicators of the Mediating Role of Psychological Capital in the Relationship between Self-Management and Nutrition Behavior

	χ^2	df	P-value	χ^2/df	RMSEA	CFI	IFI	NFI	PCFI	PNFI
Model 1	457.882	6	0.001	76.314	0.558	0.171	0.184	0.182	0.073	0.068
Model 2	11.569	8	0.172	1.446	0.043	0.993	0.994	0.979	0.522	0.530

**Table 3.** Estimate of the Direct and Indirect Effects of Self-Management oOn Nutrition Behavior

Path			Estimate	Critical value	P-value
Psychological Capital	→	Self-management	0.29	4.283	0.001
Nutrition	→	Self-management	0.28	4.478	0.001
Nutrition	→	Psychological Capital	0.22	3.310	0.001
		Standardized Indirect Effect			
Path			**Estimate**	**95% Confidence Interval of the Difference**	**P-value**
				Upper Bounds / Lower Bounds	
Self-management →	Psychologic al Capital →	Nutrition	0.064	0.026 / 0.126	0.001

The indicators to confirm SEM are not limited to the general fitness of the model indicators, but the standard parameters of the path coefficients and the corresponding T values that exist for each of the causal pathways must be considered. Accordingly, the summary of the results obtained from the fitted model is presented in Table 3.

Figure 1 shows structural model of research hypothesis. The results of the significance test of the path coefficients show that all coefficients of the direct path are significant ($t \geq 1.96$; P-value < 0.001). The coefficients of the direct effects of the variables on each other show that self-management with coefficients of 0.29 and 0.28 directly affects PC and nutrition in PwMS. Additionally, PC with coefficient of 0.22 directly affects nutrition in PwMS. Moreover, the results obtained from investigating the indirect coefficients indicate the significant indirect effect of self-management on the nutrition of PwMS with the mediating role of PC. In other words, in addition to the confirmation of direct relationships between the variables under study, the mediating role of PC in the relationship between self-management and nutrition in PwMS has also been confirmed (P-value < 0.001). In addition, the indirect effect of self-management on nutrition of people with MS is significant. The VAF index was calculated using the formula

VAF = (a×b)/(a×b) +c. to determine the intensity of the mediating effect of psychological capital.

0.18 = (0.29×0.22)/ (0.29×0.22) +0.27
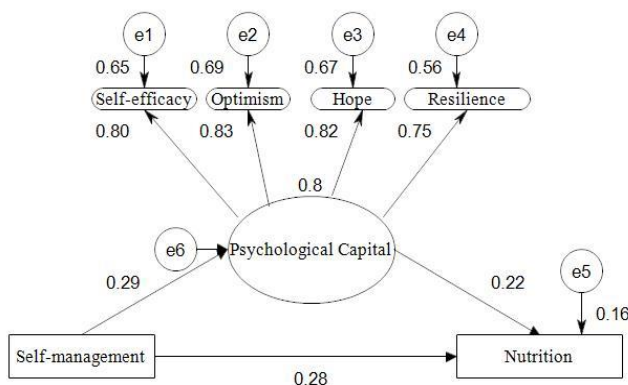
Figure 1. Structural model of research hypothesis

Given that the VAF in this study was calculated to be less than 0.20, the severity of the mediating effect of psychological capital was estimated on the relationship between self-management variables and poor nutrition behavior. However, considering that the values of the fit indices are at a desirable level, the proposed model can be trusted.

Discussion

We conducted this study with the aim to investigate the direct and indirect effect of self-management on NB with the mediating role of PC in PwMS. The results of this study can be discussed in three sections (the relationship between self-management and NB, relationship between PC and NB, and finally relationship between self-management and PC). The results showed that self-management had a positive effect on NB in PwMS. Accordingly, the present study is consistent with the study conducted by Plow et al (3). In addition, some previous studies have also shown that self-management has had a significant effect on physical activity (21,22), and health behaviors (23). Moreover, the results of the study conducted by Bombardier et al., showed that self-management program plays an effective role in improving health-promotion attitudes, including physical activity, stress management, and spiritual growth in PwMS (24).

self-management is considered as a major strategy to enhance the physical, psychological health and quality of life in patients with chronic conditions through positive health and rehabilitation sequences. The central idea of self-management the central idea of self-management is daily controlling and obviating the chronic conditions by the very people with this condition rather than their healthcare provider (25). It is expected that an increase in self-management will be associated by the improved NB in PwMS, considering that the increased personal knowledge, awareness, and responsibility are among the main components of self-management. Accordingly, PwMS can play an active and effective role in their disease management and health activities. The overall tent of self-management, in contrast, is to allow people to help themselves with the theory that the better their self-management, the better their symptom control and quality of life (26).

Other results showed that PC has a positive effect on NB in PwMS. Previous studies have shown that self-efficacy (3, 10) and quality of life (27), play an effective role in NB among PwMS. Moreover, in another study, it was found that self-esteem has a relationship with eating behaviors (28). The importance of the effect of psychological factors, and most importantly, PC on health behaviors is undeniable. For example, some of the previous studies have shown that self-efficacy (29), optimism (30), hope (31), and resiliency (32), are associated with performing health behaviors. In explaining the results, it can be said that in positive psychology, it is assumed that PC act as a protective shield in chronic conditions. PC causes people to welcome challenges and to be sure-footed in dealing with them. PC increases the individuals' ability to accept and adapt to

situations. Considering that there is no definitive cure for MS, and living in chronic conditions and managing symptoms are among the patient's resporesponsibility, it can be concluded that high PC is associated with the active participation of patients in health behaviors, including NB.

The results also showed that self-management has a positive effect on PC in PwMS. The results of some studies showed that self-management improves self-efficacy (33) and psychological status (34) in chronic patients. Moreover, another study showed that self-esteem (35) plays an effective role in self-management of PwMS. The results of previous studies indicate that self-management is associated with a wide range of positive results in the area of health and rehabilitation, and the increased self-control against disease symptoms, reduced hospitalization, reduced pain and anxiety and increased mental health (36).

Research studies have shown that depression is one of the most common psychological disorders among adults with chronic medical diseases. For many patients with chronic diseases, depression is an important barrier to performing healthy behaviors (37), and consequently, indifference, frustration, cognitive problems, and fatigue can be a big barrier to small behavioral changes to manage chronic disease (38). But the self-management knowledge facilitates the process of chronic conditions acceptance and puts the individual on the path to manage disease. Accepting the chronic conditions increases self-efficacy and self-confidence, and consequently, positive health outcomes ensue (39). Overall, just as chronic conditions are regarded as one of the public health concerns, self-management is considered as a vital approach to these conditions management, disease prevention, and health promotion.

Finally, it can be concluded that self-management and PC play an effective role in NB in PwMS. Considering that MS is associated with a wide range of physical and psychological damage, the existence of positive psychological capacities can thus play an effective role in the health behaviors of these individuals, especially with regard to nutrition. Additionally, self-management paves the way for adaptation to disease and requires acquiring knowledge and awareness on the disease. Therefore, the high level of self-management behaviors has a significant effect on the NB in PwMS. Considering the role of self-management behaviors in patients' psychological empowerment, these behaviors can enhance PC in PwMS. Generally, it can be said that self-management is capable of predicting NB in PwMS both directly and indirectly through psychological empowerment.

The most important limitation of the present study was the lack of using random and completely in-person methods to collect data. There were also many people diagnosed with the disease, but it was impossible to gather data related to them because they were not registered in the GMSS. Considering the existing limitations, the generalization of the results should be performed with caution. In order to measure self-efficacy, optimism, resiliency, and hope, we used PCQ. Though these subscales have acceptable reliability and validity, there is a high correlation between the errors of each of them because they are in a questionnaire, and the investigation of the mediating role of each of them was impossible and model 1 did not have the required fit. Therefore, we had to use the PCQ score and ignore the role of each of the subscales. Accordingly, for future studies, it is suggested that separate questionnaires be used to measure these components. In the applied area, it is suggested that the role of self-management and PC in PwMS be considered in educational programs to improve NB. We also recommend that psychological factors-based self-management would be used to improve health behaviors in clinical situations.

Conclusion
This study concluded that Self- management and PC were associated with NB in PwMS. The results of this study support the importance of these factors in health-promoting behaviors with regard to NB and the proposed model can be a suitable option in health care and nursing provided that, the fit of this model is investigated in future research and other provinces.

Ethical consideration
The study protocol has been approved by Institutional Review Board of Guilan University of Medical Science, Rasht, Iran.

Conflicts of interests
Authors declared no conflict of interest.

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