Research Paper: Health Promoting Self-care Behaviors in Patients With Multiple Sclerosis in the Southeast of Iran: Developing a Model for Practice

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Introduction: Promoting self-care practice, as a critical strategy for enhancing the quality of life in patients with Multiple Sclerosis (MS) is a challenging issue. This study aimed to propose a model of health-promoting self-care behaviors in MS patients.

Methods: In this cross-sectional study, 200 patients with MS, who had referred to the Hospital for Special Diseases in Kerman City, Iran, were chosen. The main data collection instruments were the multiple sclerosis knowledge questionnaire, the Rosenberg self-esteem scale, multiple sclerosis self-efficacy scale, questionnaire of perceived barriers and benefits of self-care behaviors, social support, the health promotion lifestyle profile II, and resilience and sense of coherence scale. Data analysis was conducted in SPSS V. 22 and AMOS18 software. The Structural Equation Modeling (SEM) was also used for further analysis of data.

Results: The model explained 82% of variance in Health-Promoting self-care Behavior (HPB). The results of the final model obtained from the SEM showed that self-efficacy ($\beta=0.53$, SE=0.04, $P=0.007$), self-esteem ($\beta=0.39$, SE=0.04, $P=0.005$), social support ($\beta=0.36$, SE=0.04, $P=0.009$), sense of coherence ($\beta=0.34$, SE=0.07, $P=0.006$), resilience ($\beta=0.33$, SE=0.07, $P=0.018$), and perceived benefits ($\beta=0.25$, SE=0.05, $P=0.009$) had a positive and significant relationship with HPB.

Conclusion: The self-care empowerment model in patients with MS presented in this study can be used as a framework for designing health promotion interventions to improve the quality of life of patients with MS.
1. Introduction

Multiple Sclerosis (MS) is one of the prevalent diseases of the 21st century. It affects all aspects of an individual’s health, including physical, mental, and social dimensions. In addition to drug therapy, physicians and health staff should pay special attention to self-care in MS patients. The results of some studies on MS patients suggest that self-care programs reduce MS complications, such as depression and stress, boost self-esteem, provide an appropriate health-promoting model, satisfy basic health needs, increase the effectiveness of health education and health promotion programs, and contribute to understanding and defining the key elements of long-term behavior modification. The present study adopts a cross-sectional approach, using the main constructs of Simmons’ health-promoting self-care behaviors model as well as important and effective self-care variables to present a model of Health-Promoting self-care Behavior (HPB) in MS patients. Path analysis was utilized to test the primary version of the conceptual model and yield a final model in addition to identifying the direct and indirect effects of each path and standardized effects. The final model revealed that self-esteem, social support, perceived benefits, self-efficacy, resilience, and sense of coherence were the main predictors of HPB. Therefore, this model can be adopted in interventions and self-care training programs for MS patients.

Highlights

- According to the final model of the path analysis, social support, perceived benefits, self-efficacy, and resilience with direct and indirect paths are significantly correlated with Health-Promoting self-care Behavior (HPB).
- Self-esteem was positively and indirectly correlated with HPB and the sense of coherence was directly correlated with HPB.
- In this regard, self-efficacy followed by self-esteem and social support are the most influential variables on HPB.

Plain Language Summary

Multiple Sclerosis (MS) affects all aspects of the individual’s health, including physical, mental, and social dimensions. In addition to drug therapy, physicians and health staff should pay special attention to self-care in MS patients. The results of some studies on MS patients suggest that self-care programs reduce MS complications, such as depression and stress, boost self-esteem, provide an appropriate health-promoting model, satisfy basic health needs, increase the effectiveness of health education and health promotion programs, and contribute to understanding and defining the key elements of long-term behavior modification. The present study adopts a cross-sectional approach, using the main constructs of Simmons’ health-promoting self-care behaviors model as well as important and effective self-care variables to present a model of Health-Promoting self-care Behavior (HPB) in MS patients. Path analysis was utilized to test the primary version of the conceptual model and yield a final model in addition to identifying the direct and indirect effects of each path and standardized effects. The final model revealed that self-esteem, social support, perceived benefits, self-efficacy, resilience, and sense of coherence were the main predictors of HPB. Therefore, this model can be adopted in interventions and self-care training programs for MS patients.
and physical and mental health problems (Fry & Debats, 2012; Ghasemipour & Nazai, 2012). Besides, the results of previous studies have shown a significant relationship between patients’ improved awareness of self-care behaviors and positive changes in the disease, including diminished anxiety, and improved quality of life. Studies have also demonstrated the key role of the two components of resilience and sense of coherence in choosing a healthy lifestyle and adopting health-promoting self-care behaviors in patients with chronic MS (Luthar, Cicchetti, & Becker, 2000; Scherer & Bruce, 2001; Wainwright et al., 2008).

Considering the above discussion about the factors influencing health-promoting self-care behaviors (self-efficacy, self-esteem, social support, perceived barriers and benefits, awareness, resilience, and sense of coherence), providing an appropriate health-promoting model and satisfying basic health needs will increase the effectiveness of health education and health promotion programs. These outcomes in turn contribute to understanding and defining the key elements for behavior modifications in the long-term (Estebsari et al., 2018).

A variety of theoretical models have been introduced for health-promoting behaviors by experts. In this context, a relatively comprehensive model called “the health-promoting self-care behaviors model” was proposed by Simmons. The model for health-promoting self-care behavior is one of the patterns that is commonly used in the field of behavior changes. This model presents a comprehensive conceptual model called the health-promoting self-care behavior model, which is based on the Orem self-care model (1985), the model of client health behavior (1982), and the Pender’s health promotion model (1987). This background provides a broad and extensive framework for identifying and explaining hypothetical factors affecting decision-making, performance, design, and assessment of interventions (Simmons S, 1990a). Given the wide array of components included in Simmons’ health-promoting self-care behaviors model, the model is primarily conceptual and hypothetical and draws on other theories and models. In this regard, it is fairly eclectic, making it a useful general guide for designing educational interventions. However, given the demographic variations and the types of chronic diseases, each subject must be matched concerning the constructs of Simmons’ model. Also, as discussed in the introduction section, the role of other important factors such as social support, resilience, and the sense of coherence in health-promoting self-care behaviors in MS patients has been documented. Therefore, the present study, based on the main constructs of Simmons’ health-promoting self-care behaviors model as well as important and effective self-care variables, adopts a cross-sectional approach to present a model of health-promoting self-care behavior in MS patients.

2. Materials and Methods

2.1. Study type and research method

This cross-sectional study was undertaken in 2018 on 200 MS patients who had referred to Kerman Hospital for Special Diseases using a simple random sampling method. Kerman City, as the capital of Kerman Province, is the largest province of Iran. With a development rate of 0.251, this province has been rated as one of the deprived areas of Iran (rank 10) in terms of health indicators (Yazdani & Montazer, 2018). According to the latest Census in 2016, Kerman has a population of about 24738 (Tabatabaei et al., 2017).

2.2. The inclusion and exclusion criteria

The inclusion criteria consisted of medical diagnosis of the relapsing-remitting type of MS, disability scale (EDSS) below 5 (i.e. patients that are not at the stage of disability), an age range of 19 to 35 years, signing informed consent for participation in the study, ability to understand the content (minimum primary education) and complete the questionnaire.

The exclusion criteria included abandoning the study for any reason or contracting a disease that prevented the participation of the subjects in the study.

2.3. Sample size

Based on the sample size formula in the correlation studies (Hulley, Cummings, Browner, Grady, & Newman, 2013), a sample of 173 was estimated with a confidence interval of 95% and the test power of 80%. Considering a 10% probable loss, a final sample size of 200 was chosen. The patients were selected using a simple random sampling method.

2.4. Data collection instruments

The study data were collected using 10 self-report questionnaires, as described below.

1-Demographic Checklist: It contains demographic information such as age, sex, marital status, educational level, number of children, living area (city, village), employment status, and monthly income.
2- Multiple Sclerosis Knowledge Questionnaire (MSKQ): It was designed by Giordano et al. in 2009. This questionnaire, which measures MS patients’ knowledge about their illness, consists of 25 three-choice items (True, False, Neutral). The total score of the scale ranges between 0 and 25 (Giordano et al., 2010). After reviewing and introducing some modifications, a 26-item questionnaire was developed, which was suitable for the diagnostic status of patients with MS in Iran, and was validated. The total score of the scale ranged between 0 and 26 and it had a Cronbach alpha coefficient of 0.76 (Safarpour, 2014).

3- Rosenberg Self-Esteem Scale (RSE): This scale, designed by Rosenberg in 1965, contains 10 two-choice items (1 agree, 1 disagree). The total score of the scale ranges between 0 and 10 (Rosenberg, 1965). It was validated for MS patients in Iran; this scale had a Cronbach alpha coefficient of 0.97 (Aghayi, Gozal, Zeinali, Ahmadi, 2017).

4- Multiple Sclerosis Self-efficacy Scale (MSSS): Designed by Rigby et al. in 2003, this scale includes 11 items that are rated on a 5-point Likert-type scale (strongly agree, agree, neutral, disagree, strongly disagree). The total score of the scale ranges between 11 and 55 points. The scale comprises three subscales of “independence and activity”, “personal control”, and “concerns and interests” (Rigby, Domenech, Thornton, Tedman, & Young, 2003). This scale was validated for MS patients in Iran and its Cronbach alpha coefficient was reported as 0.90 (Tanhayez Reshanvanlo & Soleimanian, 2012).

5. The scale of perceived barriers in MS: This scale was designed by Morowati-Sharifabad et al. in 2016 to determine the perceived barriers to self-care activities in MS patients. It contains 12 items that are rated on a 3-point Likert-type scale (never, a little, a lot). The total score of the scale ranges between 0 and 24 with higher scores indicating higher perceived barriers to self-care health-promoting behaviors in patients with MS. The face and content validities of the questionnaire was confirmed by health education practitioners and specialists and its Cronbach alpha coefficient was reported as 0.86 (Morowatisharifabad, Momeni, Esfami, Dehghani Tafti, & Hakimzadeh, 2016).

6. The scale of perceived benefits in MS: This scale was also designed by Morowati Sharifabad et al. in Iran in 2016 to determine the perceived benefits of self-care activities in MS patients. It contained 6 items assessed on a 5-point Likert-type scale (totally agree, agree, neutral, disagree, totally disagree). The total score of the scale ranges between 6 and 30 points. The face and content validities of the scale were confirmed by health education specialists and its Cronbach alpha coefficient was reported as 0.79 (Morowatisharifabad et al., 2016).

7- Connor-Davidson, Resilience scale (CD-RISC): Designed by Connor and Davidson in 2003, this scale includes 25 items that are assessed on a 5-point Likert scale (totally wrong, somewhat wrong, neutral, somewhat correct, totally correct). The total score ranges between 0 and 100 (Connor, & Davidson, 2003). This scale has been validated in Iran and its Cronbach alpha coefficient was reported as 0.84 (Hagh Ranjbar, Kakavand Borjali, & Bemars, 2011).

8- Sense of Coherence (SOC) Scale: Developed by Flensborg-Madsen et al. in 2006, this scale contains 35 questions in the form of multiple-choice questions (yes, no, I do not know). The total score of the scale ranges between 35 and 105 (Flensborg-Madsen, Ventegodt, & Merrick, 2006). This scale has been validated in Iran and its Cronbach alpha coefficient was reported as 0.89 (Ehteshamzadeh, Sabrinazarzadeh, & Mamarbashi, 2013).

9- Medical Outcomes Study-Social Support Survey (MOS-SSS): The survey was designed by Stewart et al. in 1991 to study medical consequences. It includes 19 questions rated on a 5-point Likert-type scale (never, often, sometimes, most often, always). The total score of the scale ranges between 19 and 95 points. It measures 5 aspects of social support: concrete support, emotional support, information, kindness, and positive social interaction (Stewart, Hays, & Ware, 1988). The scale has been validated in Iran and its Cronbach alpha coefficient was reported as 0.97 (Mohammadzadeh, Sayehmiri, & Mahmoudi, 2016).

10- Health-Promoting Lifestyle Profile II (HPLP II): It was developed by Walker et al. in 1995. This questionnaire includes 52 items that are assessed on a 4-point Likert scale (never, sometimes, often, and always) and measures 6 dimensions of physical activity, nutrition, spiritual growth, interpersonal relation, stress management, and health responsibility. The overall score of the scale ranges from 52 to 208 (Walker, Sechrist, & Pender, 1995). This tool has been validated in MS patients in Iran and its Cronbach alpha coefficient was reported as 0.82 (Dashti–Dehkordi, Yousefi, Maghsoudi, Etemadifar, & Maghsoudi, 2017).

In this study, the questionnaires validated in Iran, as described above, were used for data collection. Given that
multiple questionnaires had to be filled out by patients, to prevent fatigue and reduced accuracy in the target group, the scales were completed in two consecutive days.

2.5. Ethical considerations

After obtaining the necessary permits for conducting the research and making arrangements with the relevant authorities, written informed consent regarding the voluntary nature of participation in the study was obtained from MS patients. They were also ensured about the confidentiality of information, guaranteed that if the research was terminated, they would not suffer any physical or moral harm. Ethical approval was obtained from the Ethics Committee of Shiraz University of Medical Sciences (IR.SUMS.REC.1396.182) (Project No: 15554).

2.6. Study analysis

Before the analysis, the normality of the main research variables was assessed with the Shapiro-Wilk test. Data analysis was conducted in SPSS V. 22 (SPSS; Inc, Chicago, IL, USA) and AMOS18 (AMOS: ADC, Chicago, IL, USA). Descriptive statistics, the Pearson correlation coefficient, and path analysis were used to test the primary version of the conceptual model, provide a final model and identify the direct and indirect effects of each path and standardized effects. During data analysis, various model indicators such as Comparative Fit Index (CFI), the Goodness of Fit Index (GFI) (above 0.9), Root Mean Square Error of Approximation (RMSEA) (below 0.08), and the Chi-square index/degrees of freedom ($\chi^2$/df) (below 3) were evaluated, all of which indicate the suitability of the model. The primary conceptual model

Figure 1. Conceptual framework of health-promoting self-care behavior in MS patients (Ma et al., 2013; O’Brien, 1993; Simmons, 1990b; Wainwright et al., 2007)

Table 1. Descriptive statistics of theoretical constructs as potentials determinants of health-promoting self-care behaviors in the participants (n=200)

| Variables                   | N   | Mean±SD | Min. | Max. |
|-----------------------------|-----|---------|------|------|
| Perceived barriers          | 200 | 13.1±4.8| 0.0  | 20.0 |
| Perceived benefit           | 200 | 21.4±4.5| 11.0 | 30.0 |
| Knowledge                   | 200 | 14.1±4.4| 0.0  | 24.0 |
| Self-esteem                 | 200 | 6.2±2.4 | 0.0  | 10.0 |
| Social Support              | 200 | 59.6±17.6| 19.0 | 95.0 |
| Self-efficacy               | 200 | 31.8±7.3| 18.0 | 51.0 |
| Coherence                   | 200 | 73.2±13.3| 40.0 | 103.0|
| Resilience                  | 200 | 53.7±18.7| 17.0 | 100.0|
| Health promoting self-care behaviors | 200 | 117.2±34.6| 52.0 | 208.0|
for improving health-promoting self-care behaviors in MS patients, based on the main constructs of the Simmons’ health-promoting self-care behaviors model and review of the literature, is presented in Figure 1. The level of significance was less than 0.05 in all analyses.

3. Results

The Mean±SD age of the participants was 29.9±8.3 years. Concerning gender, 67% of the subjects were female and the rest were male. In terms of education, 62.5% had a diploma and tertiary degrees, and the rest held high school or lower education. More than half of the participants were married (60%). As for employment, 45% were employed and the rest were unemployed. In this study, of 220 questionnaires distributed, 200 were completed and returned (response rate=90.90%). Of 20 subjects who failed to complete the questionnaire and withdrew from the study, 11 noted dissatisfactions and 9 physical problems as the main reason.

Table 1 presents the descriptive statistics of the constructs of the health-promoting self-care behaviors model. The mean values of the constructs of the health-promoting self-care behavior model were as follows: perceived barriers (13.13), perceived benefits (21.4), knowledge (14.1), self-esteem (6.2), social support (59.6), self-efficacy (31.8), sense of coherence (73.2), resilience (53.7), and Health-Promoting self-care Behavior (HPB) (117.2).

Table 2. The correlation matrix of the health-promoting self-care behavior model (n=200)

| Variables                  | Perceived Barrier | Perceived Benefit | Knowledge | Self-esteem | Social Support | Self-efficacy | Coherence | Resilience | Health-promoting Self-care Behavior |
|----------------------------|-------------------|-------------------|-----------|-------------|----------------|---------------|-----------|------------|-------------------------------------|
| Perceived barriers         | 1                 |                   |           |             |                |               |           |            |                                     |
| Perceived benefit          | -0.018            | 1                 |           |             |                |               |           |            |                                     |
| Knowledge                  | 0.039             | 0.504**           | 1         |             |                |               |           |            |                                     |
| Self-esteem                | -0.153*           | 0.575**           | 0.503**   | 1           |                |               |           |            |                                     |
| Social Support             | -0.145*           | 0.482**           | 0.347**   | 0.492**     | 1              |               |           |            |                                     |
| Self-efficacy              | -0.123            | 0.669**           | 0.570**   | 0.754**     | 0.629**        | 1              |           |            |                                     |
| Coherence                  | -0.134            | 0.625**           | 0.448**   | 0.735**     | 0.704**        | 0.811**       | 1         |            |                                     |
| Resilience                 | -0.099            | 0.630**           | 0.464**   | 0.751**     | 0.624**        | 0.868**       | 0.816**   | 1          |                                     |
| Health promoting self-care behavior | -0.078           | 0.671**           | 0.483**   | 0.716**     | 0.675**        | 0.846**       | 0.854**   | 0.842**    | 1                                   |

*P<0.001; **P<0.05
As the results of the descriptive analysis suggest, the mean scores of the predictor constructs of self-care behaviors in MS patients were higher than 50% of the maximum construct scores. Also, the mean score of the patients’ HPB was 117.2, which is more than 50% of the maximum score (104), indicating that the participants of our study were in desirable conditions in this respect.

According to the correlation matrix, the correlation coefficient was between 0.018 and 0.868. The sense of coherence ($r=0.854$) and perceived barriers ($r=-0.078$) exhibited the strongest and weakest correlations with the HPB variable. Based on the results of the Pearson correlation coefficient, perceived benefits, knowledge, self-esteem, social support, self-efficacy, sense of coherence, and resilience, except for perceived barriers, had a direct and significant relationship with the HPB response variable at the significant level of $P<0.001$ (Table 2). Therefore, perceived barriers were removed from the primary hypothetical model (Figure 2) and the model fitness was assessed using the path analysis.

In the analysis of the modified model, the results of path analysis suggested that the perceived benefits, sense of coherence, resilience, social support, and self-efficacy had a direct and significant relationship with the HPB variable. However, the variables of knowledge and self-esteem, social support, self-efficacy, sense of coherence, and resilience, except for perceived barriers, had a direct and significant relationship with the HPB response variable at the significant level of $P<0.001$ (Table 2). Therefore, perceived barriers were removed from the primary hypothetical model (Figure 2) and the model fitness was assessed using the path analysis.

In the final analysis of the modified model, the results of path analysis suggested that the perceived benefits, sense of coherence, resilience, social support, and self-efficacy had a direct and significant relationship with the HPB variable. However, the variables of knowledge and self-esteem, social support, self-efficacy, sense of coherence, and resilience, except for perceived barriers, had a direct and significant relationship with the HPB response variable at the significant level of $P<0.001$ (Table 2). Therefore, perceived barriers were removed from the primary hypothetical model (Figure 2) and the model fitness was assessed using the path analysis.

In the modified model of pathway analysis for health-promoting self-care behaviors (Source: Original data), the sense of coherence ($r=0.854$) and perceived barriers ($r=-0.078$) exhibited the strongest and weakest correlations with the HPB variable. Based on the results of the Pearson correlation coefficient, perceived benefits, knowledge, self-esteem, social support, self-efficacy, sense of coherence, and resilience, except for perceived barriers, had a direct and significant relationship with the HPB response variable at the significant level of $P<0.001$ (Table 2). Therefore, perceived barriers were removed from the primary hypothetical model (Figure 2) and the model fitness was assessed using the path analysis.

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CFI, GFI, RMSEA, and $\chi^2$/df were estimated at 1.00, 0.99, 0.04, and 1.28, respectively; the results exhibit the desirable fitness of the model.

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In the final study of the path analysis, the results show that social support, perceived benefits, and self-efficacy and resilience directly or indirectly were positively correlated with HPB (Table 3). The standardized beta ($\beta$) coefficients from the direct path indicate that for each unit increase in social support, perceived benefits, self-efficacy, and resilience, the mean HPB score increases to 0.09, 0.11, 0.24, and 0.23, respectively, and vice versa (Figure 4).

The self-esteem variable illustrated a positive and significant correlation with HPB only indirectly ($\beta=0.39$, SE=0.04, P=0.005). The sense of coherence variable also showed a positive and significant correlation with HPB only with a direct path ($\beta=0.34$, SE=0.07, P=0.006). In this regard, considering their total effect on HPB, self-efficacy, followed by self-esteem and social support (Table 3) are the most influential variables, respectively. Table 3 presents further details of the final model.

Finally, the above model suggests that 82% of variations in the HPB variable ($R^2=0.82$) can be explained by six constructs of self-esteem, social support, perceived benefits, self-efficacy, resilience, and sense of coherence. The remaining 18% is defined by other variables.

4. Discussion

The health-promoting self-care behaviors are the major factors affecting the ability of MS patients, stimulating...
repressed, and forgotten capabilities that empower them to overcome their disabilities (Masoudi, Mohammadi, Nabavi, & Ahmadi, 2008). The present study revealed an overall good fit between the proposed model and the data. According to the results, self-efficacy, self-esteem, social support, sense of cohesion, resilience, and perceived benefits are the main predictors of health-promoting self-care behaviors among which self-efficacy exerted the highest effect.

Based on the results of this study, 67% of MS patients were female. This finding is consistent with those reported in previous studies according to which the female patients outnumber the male patients by 3 to 4 times (Mousavizadeh et al., 2018; Sedaghat, Jessri, Behrooz, Mirghotbi, & Rashidkhani, 2016). The higher rate of MS among women may be related to their physiological features such as sex hormones and stress. Additionally, the growing incidence of MS in females suggests that hormonal differences make women more susceptible to environmental risk factors (Izadi, Nikseresht, Poursadeghfar, Borhaniahghighi, & Heydari, 2015).

Like similar studies, the mean age of participants in this research was 29.9 years (Mousavizadeh et al., 2018). This may be due to a variety of adolescence-related factors, such as education, university entrance exam, occupation, or marriage, which are major determinants of one’s future life and failure in any of these areas could be a source of stress.

The number of married participants in this study was twice that of single adults. This finding may be prompted by factors related to marriage and childbearing, which guide individuals into important stages of life, and failure to adapt to new situations may be a source of stress and anxiety, which are major predictors of MS. Also, more than 50% of patients were university students or had a university degree, which is in agreement with the findings of Abedini et al. (2016). The results of studies have exhibited that the effect of education on health is greater than that of income and occupation, as illiteracy can be linked to a sense of irresponsibility concerning health and treatment. Moreover, people who have a university degree are more likely to appreciate the effect of health-promoting self-care behaviors (Karimy, Abedi, Amin-Shokravi, & Tavafian, 2013).

Furthermore, the current study suggests a positive and significant correlation between self-efficacy and HPB. The results of the path analysis model exhibited that, both in the direct and the indirect paths, with one unit increase in self-efficacy, the mean HPB score rose by 0.24 and 0.28, respectively. Also, according to the results, the self-efficacy variable exerts the highest effect on HPB, which is in agreement with the results of previous studies (Finn, 2006; Polsingchan, 2010; Salahshoori et al., 2015). In a 2007 study by Wu et al. on patients with type 2 diabetes, health-promoting self-care behaviors were found to be in a positive and significant relationship with the duration of the disease, the outcome expectation, and self-efficacy of patients. The researchers concluded that self-efficacy improvement models contribute to the adoption of health-promoting self-care behaviors (Wu et al., 2007). In his model of self-promotion, Pender found that self-efficacy was one of the major predictors...
Moreover, 86% of studies on the health promotion model has endorsed the role of self-efficacy as a predictor of behavior (Pender, Murdaugh, & Parsons, 2006). However, Wendling et al. found no significant relationship between patients’ self-efficacy and their self-care behaviors (Wendling & Beadle, 2015). This may be due to the diversity of research environments and subjects, or data gathering tools.

The current findings indicate a positive and significant correlation between self-esteem and HPB. According to the results of path analysis, in an indirect path, with improved self-esteem, the mean HPB score rises by 0.39, which is consistent with the literature. For example, the study of Madani et al. on 38 patients with MS revealed a significant relationship between the self-esteem of patients and health-promoting self-care behaviors. Patients with a higher sense of self-esteem were more likely to adopt health-promoting self-care behaviors to deal with their problems, while patients with low self-esteem tended to adopt emotionally-focused oppositional methods (Madani, Navipour, & Rouzbayani, 2008). Also, in a study on the relationship between self-esteem, social support, and oppositional behavior in MS patients, O’Brien found a significant relationship between self-esteem and problem-oriented oppositional methods, including health-promoting behaviors. Moreover, the necessity of assessing self-esteem, social support, and coping behavior in patients with MS has been emphasized (O’Brien, 1993). Health-promoting self-care behaviors are one of the coping behaviors in MS patients that encourages patients to take responsibility for their health (Acton & Malathum, 2000). This correlation, however, was not observed in the study of Sinclair et al. and Von Bothmer et al. (Sinclair & Scroggie, 2005; Von Bothmer & Fridlund, 2005). This discrepancy of results could be attributed to different research environments, subjects, or data gathering tools.

Based on these findings, there was a positive and significant correlation between social support and HPB. Hence, the results of the path analysis model revealed that both in the direct and the indirect paths, one unit increase in the social support variable raised the mean HPB score by 0.28 and 0.09, respectively. In practice, a high level of social support can improve health-promoting self-care behaviors. In this context, other studies have demonstrated the positive impact of social support on HPB (Alizadeh, Keshavarz, Mirghafourvand, & Zayeri, 2018; Ballard, 2009). However, the study of Yi Ps et al. has not reported a relationship between perceived social support and HPB (Pan, Cameron, Desmeules, Morrison, Craig, Jiang, 2009). This discrepancy of results could be attributed to different research environments or data gathering tools. Social support is critical to health promotion as it accelerates physical and emotional needs, protecting individuals against stressful living conditions (Ballard, 2009). It is, therefore, important to boost social support (financial, emotional, and informational) in MS patients to promote HPB and reduce the wide range of problems associated with the disease, including financial problems linked to the purchase of drugs and emotional problems (Mazaheri, Fanian, & Zargham-Boroujeni, 2011).

### Table 3. Directions and standard coefficients of the pathway model

| Pathway          | Total Effect | Indirect Effect | Direct Effect |
|------------------|--------------|-----------------|---------------|
|                  | β*           | SE             | P             | β*           | SE             | P             | β*           | SE             | P             |
| Self-esteem> HPB | 0.39         | 0.04           | 0.005<sup>*</sup> | 0.39         | 0.04           | 0.005<sup>*</sup> | ---           | ---           | ---           |
| Social Support> HPB | 0.36         | 0.04           | 0.009<sup>*</sup> | 0.28         | 0.04           | 0.009<sup>*</sup> | 0.09         | 0.04           | 0.047<sup>*</sup> |
| Perceived benefit> HPB | 0.25         | 0.05           | 0.009<sup>*</sup> | 0.14         | 0.03           | 0.007<sup>*</sup> | 0.11         | 0.04           | 0.008<sup>*</sup> |
| Self-efficacy> HPB | 0.53         | 0.04           | 0.007<sup>*</sup> | 0.28         | 0.05           | 0.032<sup>*</sup> | 0.24         | 0.06           | 0.007<sup>*</sup> |
| Resilience> HPB | 0.33         | 0.07           | 0.018<sup>*</sup> | 0.10         | 0.03           | 0.004<sup>*</sup> | 0.23         | 0.07           | 0.020<sup>*</sup> |
| Coherence> HPB | 0.34         | 0.07           | 0.006<sup>*</sup> | ---           | ---           | ---           | 0.34         | 0.07           | 0.006<sup>*</sup> |

χ²/df=1.28, GFI= 0.99, CFI=1.00, RFI=0.98, NFI=1.00, RMSEA=0.037, Hoelter Index=590

HPB: Health-promoting self-care behavior; χ²/df: Chi-squared/degree of freedom; GFI: The goodness of fit index; CFI: Comparative fit index; IIF: Incremental fit index; NFI: Normed fit index; RMSEA: Root mean square error of approximation; * Standardized beta; <sup>*</sup> P values are significant.
The results also exhibit a positive correlation between the sense of coherence and HPB. In the direct path, a unit increase in the sense of coherence augmented the average HPB score by 34.4. Other researchers reported similar results. For example, in a pilot study on students in Finland, physical activity was found to be positively related to the sense of coherence (Hassmen, Koivula, & Uutela, 2000). Another study also suggested that a low sense of coherence was strongly linked to smoking behaviors (Glanz, Maskarinec, & Carlin, 2005).

In the present study, a positive and significant correlation was observed between resilience and HPB. The results of the path analysis model revealed that both in the direct and the indirect paths, one unit increase in the resilience raised the mean HPB score by 0.23 and 0.10, respectively. In this regard, the 2013 study of Chang on patients with chronic renal disease reported a positive and significant relationship between resilience and HPB dimensions (Ma et al., 2013).

Since two constructs of resilience and sense of coherence are predictable, problem-oriented decision-making interventions can be employed to help individuals learn how to come to terms and cope with their diseases. Particularly, stress management training for MS patients can affect both the sense of coherence and the degree of patients' resilience. In other words, in chronic diseases, it is essential to help patients set a target for recovery, hamper the progression of the disease, strengthen positive thinking and the adoption of a positive attitude towards life and future, and mitigate disappointment (as studies have shown that disappointment in chronic patients exerts influence on resilience). In the same vein, the ability to communicate with others and establish useful social networks are fundamental as expanded communication network precludes isolation and reduces depression and frustration in patients (Dayapoğlu, & Tan, 2012; Valizadeh, Sohrabnejad, Mehraban, & Ahmadbokani, 2014).

According to the results, perceived benefits are also positively and significantly correlated with HPB. Moreover, the results of the final path analysis model indicated that the standardized coefficients of direct and indirect paths of perceived benefits of HPB were 0.19 and 0.14, respectively. In other words, with increased perceived benefits, the mean HPB score soared by 0.19 and 0.14, which is statistically significant. In this regard, several studies have reported the significant correlation between perceived benefits and health-promoting self-care behavior in chronic diseases (Aalto & Uutela, 1997; Koch, 2002), though this correlation was not observed in the study of Gillibrand & Stevenson, (2006). This discrepancy of results could be attributed to different research environments and or data gathering tools.

4.1. Study strengths and limitations

This is the first study to adopt SEM to test a comprehensive theoretical model that combines the constructs of Simons’ health-promoting self-care behavior model and other constructs derived from the literature review as predictors of self-promoting self-care behaviors in MS patients in Iran. The new model presented in the study, i.e. “self-care empowerment model in MS patients”, demonstrates strong predictors of health-promoting self-care behaviors (both direct and indirect) in MS patients. It is one of the major strengths of this study besides its innovation.

Our study also had several limitations. One major limitation of the study was the reluctance of some patients to participate in the project. Another limitation was concerned with data gathering based on patients’ self-report, which precluded accurate observations by the researcher. Therefore, an objective review and periodic follow-ups might yield different outcomes. The last limitation had something to do with the nature of MS disease and the large number of questions, which made the completion of questionnaires an exhausting task for some patients.

It is suggested that future interventional studies on promoting self-care behaviors in patients with MS based on the above model as well as qualitative studies identify other predictors of health-promoting self-care behavior. Moreover, since it was not possible to evaluate health status in the research environment and patients’ residence, it is recommended that future research considers this issue to account for marginalized patients.

5. Conclusion

The study findings revealed that a higher level of self-efficacy, self-esteem, social support, sense of coherence, resilience, and perceived benefits improved health-promoting self-care behaviors in MS patients. The current study also suggested that besides the main constructs of the Simons model, factors such as resilience, sense of coherence, and social support play significant roles in the adoption of health-promoting self-care behaviors. Therefore, these factors should be considered by health professionals and physicians in designing and implementing programs for MS patients. In conclusion, this model of health promotion is recommended as a way of improving self-care behaviors in MS patients.
Ethical Considerations

Compliance with ethical guidelines

The study was approved by the Ethics Committee of Shiraz University of Medical Sciences (Ref: IR.SUMS.REC.1396.182) and written consent forms were taken from all participants.

Funding

The research project was financially supported by Shiraz University of Medical Sciences, Shiraz, Iran (Grant No: 15554).

Authors' contributions

All authors were equally contributed in preparing this article.

Conflict of interest

The authors declared no conflict of interest.

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