A Structural Equation Model of Self-care Activities in Diabetic Elderly Patients

Abstract

Background: Self-care is a valuable strategy to improve health and reduce events of hospitalization and the duration of hospital stay in elderly diabetic patients. This study aimed to examine the model of self-care behaviors in elderly diabetic patients. **Materials and Methods:** A survey was conducted among 209 diabetic elderly patients who were admitted in three hospitals affiliated with the Isfahan University of Medical Sciences, Iran. Convenience sampling method was used to recruit the participants. Depression, anxiety, stress, and perceived social support were considered as predicting exogenous variables and elderly patients' self-care activities were treated as endogenous variables. The data were collected by a four-part questionnaire consisting of demographic and health-related characteristics; 21-item depression anxiety stress scale, multidimensional scale of perceived social support, and Diabetes Self-care Activities scale. Structural equation modelling by Statistical Package for the Social Sciences (SPSS) version 16 and Analysis of Moment Structures-7 (AMOS) software was applied for data analysis. **Results:** Mean (standard deviation) of depression, anxiety, stress, perceived social support, and self-care activities of participants were 14.29 (4.3), 13.62 (3.74), 16.83 (4.23), 57.33 (14.19), and 44.56 (13.77), respectively. The results showed that the overall model fitted the data (χ^2/df = 3.8, goodness-of-fit index (GFI) = 0.52, incremental fit index (IFI) = 0.48, and root mean square error of approximation (RMSEA) = 0.14). Three out of four variables (i.e., perceived social support, anxiety, and depression) significantly predicted adherence to self-care behaviors among diabetic elderly patients ($p < 0.05$). **Conclusions:** The perceived social support, anxiety, and depression were identified as key constructs which need to be taken into account and well managed by health care professionals to enhance adherence to self-care activities in diabetic elderly patients.

Keywords: *Aged, diabetes, self-care*

**Mousa Alavi[1],
Razieh Molavi[1],
Parvin Eslami[1]**

[1]*Nursing and Midwifery Care Research Center, Faculty of nursing and midwifery, Isfahan University of Medical Sciences, Isfahan, Iran*

Introduction

Elderly population is increasing worldwide.[1] Such a rapid growth in elderly population has challenged health care systems, particularly in Iran,[2] to meet the complexities of caring for such a vulnerable population who are at risk of various health problems and disabilities.[3]

Evidences show that currently diabetes is one of the chronic and disabling diseases that is seriously threatening the health of elderly population worldwide[4] and Iran is not an exception.[5] Diabetes in elderly is associated with poor health outcomes that lead to frequent hospitalizations,[6] which puts elderly at serious health risks such as irreversible decline of physical and cognitive function,[7] leading to increasing hospital costs, decreasing efficacy of clinical care, and other adverse consequences.[8]

Enhancing self-care activities (SCA) is now identified as a valuable strategy to meet health care needs and improve health as well as reduce events of hospitalization of diabetic elderly patients.[9,10] Despite emphasizing the importance of self-care in elderly patients, some studies have reported the self-care status in elderly patients as poor.[11-13] Hence, some researchers began to study the determinants of self-care, particularly in the elderly population. It is emphasized that ability to perform self-care varies according to many social determinants and health conditions.[12] While most studies have recently focused on the role of psychological and social determinants of self-care in diabetic patients[14,15] or elderly patients,[16,17] their possible contribution among the diabetic elderly patients, particularly in Iranian population, have been poorly investigated.

It is essential to consider the interplaying roles of psychological and social factors as an integrated model of psychosocial factors, which fits the nature of such a complex phenomenon as psychosocial determinants of self-care in diabetic elderly patients. Therefore, this study aimed to evaluate the model of psychosocial determinants of self-care in diabetic elderly patients hospitalized in selected hospitals affiliated with the Isfahan University of Medical Sciences.

Materials and Methods

This cross-sectional study was conducted among 209 diabetic patients aged 60 years and more who were admitted in three hospitals affiliated with the Isfahan University of Medical Sciences, Iran from April to August 2016.

The sample size was estimated using the Power Analysis and Sample Size software program ((PASS), Utah, USA. Dattalo[18] suggested this method to be an appropriate method of power analysis and calculating sample size. Type I error probability and statistical power were considered to be 0.05 and 0.8, respectively. The effect size coefficient was considered to be 0.2 to get the maximum number of sample. Number of independent variables was considered as 4 (i.e., depression, anxiety, stress, and perceived social support). In total, data from 209 participants were analyzed.

Convenient sampling method was used to recruit the participants, such that according to the total number of diabetic elderly diabetics hospitalized in each center during the study period, the share of each center was identified and then the participants were sampled conveniently.

Data was collected by a trained person using a four-part questionnaire consisting of (a) demographic and health related characteristics, (b) 21-item Depression Anxiety Stress Scale (DASS-21), (c) Multidimensional Scale of Perceived Social Support (MSPSS), and (d) The Summary of Diabetes Self-Care Activities (SDSCA) questionnaire. The DASS-21, which is a standard scale,[19] contains 21 items or phrases to measure individuals' depression, anxiety, and stress on a four-point Likert's scale (never, few, sometimes, and always) with scores of 0 to 3 and a total range of 0–21. The MSPSS contains 12 items on a seven-point Likert's scale (from 1 indicating completely disagree to 7 indicating completely agree) with a total score of 12–84; higher scores indicate better social support. The SDSCA questionnaire[20] is a validated 12-item self-report recall measure of adherence over the past 7 days to certain important aspects of the diabetes self-care regimen. The participants mark how many of the past 7 days they have adhered to each of the behaviors listed on the scale. Mean scores are calculated for each self-care behavior, and a total adherence score can be obtained by summing the mean subscale scores.

Internal consistency of the Persian version of the DASS-21[21] and MSPSS (Cronbach's alpha = 0.89)[22] has

already been supported. The internal consistency of the SDSCA questionnaire has also been supported in an Iranian study (Cronbach's alpha = 0.68).[23]

After obtaining ethical and official permission, the participants were interviewed in the hospitals and were acquainted with the research objectives. Subsequently, the researcher distributed the questionnaires, and the participants filled the questionnaires personally and/or by the researcher (in the case of any problem with filling).

In addition to descriptive statistics (percentiles, mean, and standard deviation) and other analysis to examine the relationship between demographic/health related characteristics variables, our key analysis was structural equation modelling (SEM)[24] to examine the model of SCA in diabetic elderly patients based on psychosocial variables (i.e., depression, anxiety, stress, perceived social support, and self-care behaviors). Before SEM analysis, data were checked to ensure that it meets the key assumptions of the analysis. For each of the predicting variables, the normality assumption of the variables was satisfied such that almost all values of skewness and kurtosis were within Plus-Minus 2, indicating an acceptable range of values.[25] The version 16 of the SPSS and AMOS-7 software (SPSS, AMOS Inc., Chicago, IL, USA) was used for all analyses, and all analyses were two-tailed.

Ethical considerations

The ethical considerations were met. Participants signed an informed consent. Moreover, their privacy, confidentiality, and volunteer participation were ensured.

Results

The descriptive statistics are presented in Table 1. The analysis initially began by the hypothesized model [Figure 1]. However, 6 items (i.e., 4 items measuring anxiety, 1 item measuring stress, and 1 item measuring SCA) were further dropped because of insignificant regression weights (less than 3). The hypothesized model was constructed from five constructs of depression, anxiety, stress, perceived social support, and self-care behaviors, each of which were measured by 7, 7, 7, 12 and 12 items, respectively.

The results of the SEM showed that 3 out of 4 exogenous predicting variables (i.e., perceived social support, anxiety, and depression) had significant regression weights on the endogenous, predicted variable, SCA indicating that they significantly predicted the SCA of diabetic elderly patients [Table 2]. As can be seen in Table 2, all indicators have *t*-values more than 2, indicating significant and acceptable regression weights of the respective items.[26]

Moreover, the proportion of Chi-square to degree of freedom (df) showed that the structural model has an acceptable fit with the data (χ^2/df = 3.8 <5). However,

Table 1: Demographic characteristics of the study subjects

Variable	Mean (SD) or *n* (%)
Age, mean (SD)	68.6 (7.7)
Sex, *n* (%)	
Female	98 (46.9)
Male	111 (53.1)
Marriage status, *n* (%)	
Single	2 (1)
Married	159 (76.1)
Widowed	46 (22)
Divorced	2 (1)
Income, *n* (%)	
Less than expenses	126 (60.3)
Equals expenses	78 (37.3)
More than expenses	5 (2.4)
Residency, *n* (%)	
Home (with family)	175 (83.7)
Home (alone)	31 (14.8)
Nursing home	2 (1)
Missing	1 (.5)
Education, *n* (%)	
Illiterate	124 (59.3)
Primary education and middle school	63 (30.1)
Diploma	13 (6.2)
Academic studies	9 (4.3)

indices have not significantly supported such a fitness (GFI = 0.52, IFI = 0.48, and RMSEA = 0.14).

Discussion

The present study aimed to evaluate the model of psychosocial determinants of SCA in diabetic elderly patients hospitalized in Isfahan. The results showed that three out of four latent variables (i.e., perceived social support, anxiety, and depression) significantly predicted adhering to the self-care behaviors.

The findings highlighted the role of perceived social support to predict SCA in diabetic elderly patients. Such a finding is in line with findings from some other similar studies.[12,15] However, it is inconsistent with that reported by Hackworth *et al*.[27] who found that social support and engagement in community activities was not influential on diabetes self-care. Miller and DiMatteo[28] pointed out that the exact mechanism by which social support affects treatment adherence and SCA is not yet completely understood.

The findings also supported significant predicting role of anxiety and depression in SCA of diabetic elderly patients. Higher scores of anxiety and depression were associated with low scores in self-care behaviors. This finding is in line with the study reported by Mut-Vitcu *et al*.[29] It is revealed that positive psychological health may sustain long-term coping efforts, and thus, facilitate diabetes
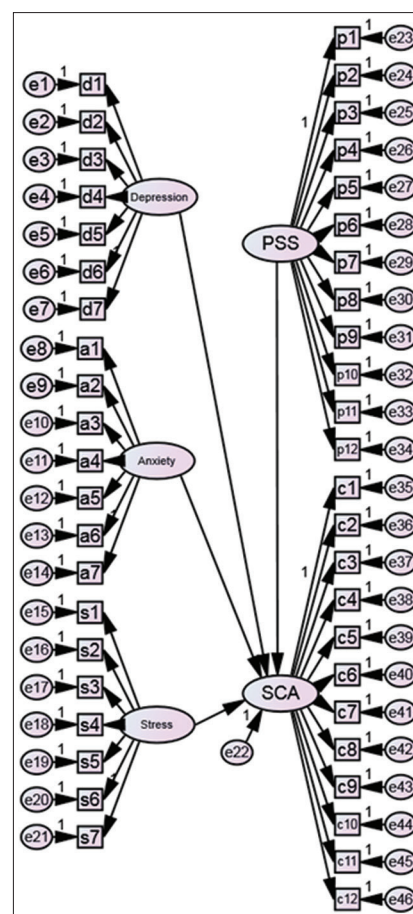

Figure 1: Hypothesized structural model of predicting diabetic elderly patients' SCA based on four psychosocial factors. Note. The PSS is perceived social support and SCA is self-care behaviours

self-management behaviors.[30] The role of psychological factors is of significant importance in Iranian elderly population who has been shown to have low happiness.[31]

A notable finding was the insignificant role of stress in predicting SCA of the diabetic elderly patients in this study. This finding was not in line with the findings of Albright *et al*.[15] who found that personal stress were strongly associated with self-care in in adults with type 2 diabetes. Future studies are recommended to clarify the role of stress in SCA of the elderly patients.

Some studies have shown significant role of self-care education in elderly patients' SCA[32] and some others have supported the effect of training program on depression, anxiety, and stress in older adults.[33] Therefore, it would be worthwhile to suggest similar programs to decrease depression, anxiety, and stress and to improve SCA in diabetic elderly patients.

Despite the strong association between three out of four predicting variables of the structural model, borderline values of the indices suggested adding a caution about the overall fit of the model.

Table 2: Unstandardized and Standardized estimates as well as *p*-values of the association between items and factors

Regression Weights			Unstandardized estimates	S.E.	Standardized estimates	*t*-value	*p*
SCA	<---	PSS	0.765	0.247	0.403	3.102	0.002
SCA	<---	Anxiety	−0.803	0.297	−0.270	−2.700	0.007
SCA	<---	Stress	−0.198	0.309	−0.050	−0.642	0.521
SCA	<---	Depression	−1.672	0.518	−0.402	−3.227	0.001
d1	<---	Depression	2.384	0.565	0.587	4.221	***
d2	<---	Depression	2.189	0.572	0.481	3.826	***
d3	<---	Depression	2.498	0.549	0.737	4.549	***
d4	<---	Depression	1.609	0.450	0.427	3.575	***
d5	<---	Depression	1.874	0.477	0.505	3.930	***
d6	<---	Depression	1.233	0.338	0.441	3.644	***
d7	<---	Depression	1.000		0.442		
a4	<---	Anxiety	1.049	0.200	0.658	5.237	***
a5	<---	Anxiety	1.380	0.264	0.651	5.233	***
a7	<---	Anxiety	1.000		0.681		
s1	<---	Stress	1.852	0.636	0.507	2.914	0.004
s2	<---	Stress	1.169	0.470	0.314	2.489	0.013
s4	<---	Stress	2.420	0.791	0.654	3.059	0.002
s5	<---	Stress	3.733	1.218	0.976	3.065	0.002
s6	<---	Stress	1.568	0.565	0.422	2.776	0.006
s7	<---	Stress	1.000		0.259		
p1	<---	PSS	1.000		0.336		
p2	<---	PSS	0.813	0.326	0.248	2.495	0.013
p3	<---	PSS	0.825	0.242	0.424	3.406	***
p4	<---	PSS	1.101	0.321	0.431	3.432	***
p5	<---	PSS	1.316	0.395	0.405	3.336	***
p6	<---	PSS	3.111	0.731	0.950	4.255	***
p7	<---	PSS	2.937	0.695	0.907	4.227	***
p8	<---	PSS	0.702	0.253	0.290	2.775	0.006
p9	<---	PSS	3.049	0.721	0.914	4.232	***
p10	<---	PSS	1.651	0.475	0.443	3.474	***
p11	<---	PSS	1.155	0.311	0.527	3.715	***
p12	<---	PSS	2.900	0.682	0.946	4.253	***
c1	<---	SCA	1.000		0.575		
c2	<---	SCA	0.946	0.173	0.556	5.483	***
c3	<---	SCA	0.947	0.154	0.653	6.146	***
c4	<---	SCA	0.377	0.163	0.207	2.308	0.021
c5	<---	SCA	1.105	0.195	0.582	5.670	***
c6	<---	SCA	1.297	0.194	0.747	6.693	***
c7	<---	SCA	1.337	0.255	0.525	5.252	***
c8	<---	SCA	1.416	0.262	0.545	5.402	***
c9	<---	SCA	1.466	0.249	0.612	5.879	***
c10	<---	SCA	1.888	0.276	0.777	6.849	***
c11	<---	SCA	0.259	0.080	0.297	3.236	0.001

***p*-value is less than 0.001. PSS: perceived social support; SCA: self-care activities; d: depression indicator; a: anxiety indicator; s: stress indicator; p: indicator of PSS; c: indicator of SCA and arrow (<---) indicates regression weight

Conclusion

In conclusion, perceived social support, anxiety, and depression were identified as key constructs which need to be taken into account and well managed by health care professionals to enhance adherence to SCA in diabetic elderly patients. Further studies to imperially test the effect of each of these factors on diabetic elderly health condition are recommended.

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Conflicts of interest

There are no conflicts of interest.

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