

**ORIGINAL RESEARCH**

# APPLICATION OF HEALTH PROMOTION MODEL FOR BETTER SELF-CARE BEHAVIOR IN PATIENTS WITH DIABETES MELLITUS

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**Abstract**

**Background:** Diabetes mellitus (DM) is a major health problem in the world. DM patients should be able to perform self-care behavior. Diabetic self-care behavior is an effective strategy for controlling diabetes.

**Objective:** The purpose of this study was to examine a health promotion model in patients with type 2 diabetes mellitus.

**Methods:** A cross-sectional design was used, which involved 177 patients with type 2 diabetes from primary health care in Denpasar Bali Indonesia with a stratified random sampling. Independent variables were personal factors (age, sex, education, body mass index, socioeconomic status, self-motivation, illness perception, and belief), self-efficacy, and family support. The dependent variable was self-care behavior. A structural equation model was used to confirm the hypothesis model.

**Results:** Personal factors (education, socioeconomic, and perceptions) ( $t = 2.891$ ) and family support ( $t = 5.746$ ) were associated with self-care behavior. Self-efficacy did not affect self-care behavior ( $t = .139$ ).

**Conclusion:** Diabetes self-care behavior is influenced by socioeconomic status, level of education, perception of the illness, and family support. Therefore, it is suggested for nurses to apply the health promotion model approach to increase self-care behavior of patients with type 2 diabetes mellitus.

**KEYWORDS**

diabetes mellitus; self-efficacy; family support; personal factors; self-care behavior

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## INTRODUCTION

One of main problems of diabetes management is behavior of patients towards their disease, which is influenced by different concepts and beliefs. Those who have gained knowledge about the management of the disease do not always apply the desired behavior change (Sharoni & Wu, 2012). Lack of attention to self-care behavior is a major cause of failure in the diabetes health program (Vazini & Barati, 2014) although lifestyle behavior is significantly associated with the risk of type 2 diabetes mellitus (DM) (den Braver et al., 2017). The evidence shows that the self-care behavior among diabetic patients is still low (Vazini & Barati, 2014).

Globally, it is more than 346 million people are estimated to have diabetes. This incidence is expected to rise to 592 million by 2035 (Bhandari & Kim, 2016; Waki et al., 2016). The incidence and

prevalence of type 2 diabetes in many parts of the world increased, about 20% -25% of people aged over 65 years in the United States and Korea suffer from diabetes (Al-Amer et al., 2016; Kusnanto, 2017; M. Song et al., 2015). In Indonesia, the number of diabetic patients increased from 8.4 million in 2000 to around 21.3 million in 2030, which most likely occurs at a young and productive age. The second report shows an increase in the number of people with DM as much as 2-3 times in 2030 (Kusnanto, 2017). In Denpasar, the number of new incidences of diabetic patients by 2016 in all health centers is 3,400 incidents.

Diabetic patients have chronic complications from their disease (Kav et al., 2017), which affects mental and physical health. The other chronic complications are eye, kidney, cardiovascular, and nervous disorders. Prevention and cure of efficient strategies are

needed to reduce the burden of the medical and economic. However, the problem of diabetes patients can be solved with self-care. Self-care will improve the quality of life and prevent acute and chronic complications of diabetes (Laxy et al., 2014; Vazini & Barati, 2014). In self-care, patients are responsible for managing day-to-day care for their illness (Kusnanto, 2017; Laxy et al., 2014).

Diabetes management is related to lifestyle management, meal planning, physical exercise, medication adherence, weight control, monitoring blood glucose or urine levels, and psychological management of patients (Kusnanto, 2017). Adherence to self-care behaviors is necessary to prevent diabetes complications and improve the quality of life (Seo et al., 2017). A study by M. Song et al. (2015) explains that self-care behavior is an important strategy for achieving control of blood sugar, blood pressure, and cholesterol. Some research suggests that self-care behaviors improve health and quality of life, increase patient satisfaction, reduce healthcare costs, provide better symptom management, and improve survival (Vazini & Barati, 2014).

To explain health improvement behavior among diabetic patients, this present study uses Pender Health Promotion Model as a comprehensive theoretical model (Dehdari et al., 2014), which explains the personal factors, perceived benefits of action, perceived obstacles to action, perceived self-efficacy, activity influences, interpersonal influences, and situational influences are important elements in behavioral change (Kurnia et al., 2017). Although this model can be used to explain various health behaviors, only a few studies have used this model (Dehdari et al., 2014). In Bali, there is no single study that has investigated the application of health promotion models on self-care behavior in diabetic patients. The application of health promotion models could help health service providers to proper interventions. Therefore, the aim of this study was to examine the application of health promotion models in patients with type 2 diabetes mellitus in the Denpasar Health Centre area, Bali Indonesia.

## METHODS

### Study Design and Sample

This study employed a cross-sectional design with 177 diabetic patients who were selected using a stratified random sampling. The inclusion criteria of the respondent were: a) aged 20-65 years (age group of >80 years may be difficult to read, low prevalence of type 2 DM at age <20 years (Lee et al., 2016), and b) holding high school educational background as minimum level of education.

### Instruments

The instruments in this study included:

- 1) *Demographic data*, consisting of 8 questions: respondent's name (initial), age, gender, weight, height, Body Mass Index (BMI), education, occupation, income, length of suffering from diabetes mellitus.
- 2) *Motivation* was measured using a modification of the questionnaire derived from the Treatment Self-Regulation Questionnaire (TRSQ) developed by Ryan and Deci (2000).

The questionnaire is composed of 19 statements consisting of reasons for undergoing medication and blood sugar checks (8 items) as well as reasons for complying with diet and exercise rules (11 items) ( $r = .367$ ; Cronbach's  $\alpha = .909$ ).

- 3) *Illness perception* was measured using The Brief Illness Perception Questionnaire (IPQ-R brief) (Broadbent et al., 2006). The questionnaire consists of 8 items with 11 scale points (range 0-10) ( $r = .506$ ; Cronbach's  $\alpha = .812$ ).
- 4) *Trust* was measured using System of Belief Inventory (SBI) - 15R to obtain religious beliefs (belief in transcendence and transcendent meaning about human life) and the presence of religious practices (sub-items of belief, 10 items), and support received by the community religious (support items, 5 items: 3, 5, 7, 9, 13). Each item's score consists of a 4-point Likert scale (from 0 to 3) (Ripamonti et al., 2010) ( $r = .467$ ; Cronbach's  $\alpha = .946$ ).
- 5) *Self-efficacy* was measured using diabetes management self-efficacy scale (DMSES) questionnaire (Bijl et al., 1999), which consists of 15 questions with a choice of confidence ranges in the ability to do activities or not ( $r = .362$ ; Cronbach's  $\alpha = .840$ ).
- 6) *Family support* was measured using the Hensarling Diabetes Family Support Scale Questionnaire adapted from the Hensarling's Diabetes Family Support Scale (HDFSS) (Hensarling, 2009) The scale consists of 29 question items ( $r = .395$ ; Cronbach's  $\alpha = .940$ ).
- 7) *Self-care behavior* was measured using a modification of the questionnaire derived from The Summary of Diabetes Self Care Actions (SDSCA) developed by Toobert et al. (2000) ( $r = .743$ ; Cronbach's  $\alpha = .812$ ).

All instruments were translated into Indonesian language. Permission was obtained to use all instruments. All items were rated using a Likert scale. The higher score denotes good level and lower score denotes bad level. The scoring process was not affected by demographic factors, such as age, gender, level of education, BMI, and socioeconomic status.

### Data Collection

Data collection was conducted from January 9 to February 9, 2018. The research was conducted in all community health centers in the Denpasar working area. The researchers coordinated with nurses at the community health centers in regards to the research plan. The nurses provided information to diabetic patients to take a part in research activities. The researchers then selected the respondents who met the inclusion criteria. Prior to data collection, the research objectives, benefits, time, respondent rights were explained. If the participants agreed to participate, they signed an informed consent, and followed by filling in all questionnaires.

### Data Analysis

A variance or component-based structural equation model called PLS (Partial Least Square) was used for data analysis. A model analysis of the structural equation model in PLS consists of an inner model that specializes in the relationship between latent variables (structural model), and an outer model that specializes in the relationship between latent variables with indicators. The

model evaluation consists of two evaluation parts: 1) Evaluation of the measurement model or outer model, which is evaluated based on the validity results and the reliability of the indicator. The indicator is said to be valid if it has an outer loading value above .5 and a t-statistic value above 1.96. The reliability was examined using the indicators of the construct that form them. 2) Evaluation of structural model or inner model, which aims to know the magnitude of influence or relationship of causality between variables in the study, namely by obtaining the value of R square or coefficient of determination. 3) Hypothesis testing (Ghozali, 2008).

#### Ethical Consideration

The respondents involved in this study have been given an appropriate informed consent. This study was approved by the

Research Ethics Committee Faculty of Nursing, Airlangga University (Approval Number: 611-KEPK).

## RESULTS

#### Characteristics of Respondents

Table 1 shows that the average age of the respondents was 57.35 years, with the average BMI of 22.96 kg/m<sup>2</sup>, and average socioeconomic status of Rp 1,532,800. Most respondents had a high school educational level, and their self-motivation was in a good category. Majority of participants had poor perceptions of disease, and poor self-efficacy. The family support in diabetic patients was also in a poor category.

**Table 1** Characteristics of Respondents

Characteristics	f= 177	%	Mean	Std. Deviation
<b>Age</b>				
Late adulthood (36-45 years)	3	1.7	57.35 year	4.89 year
Early elderly (36-45 years)	56	31.6		
Late elderly (56-65 years)	118	66.7		
<b>Gender</b>				
Male	94	53.1	-	-
Female	83	46.9		
<b>Education level</b>				
High school	117	66.1	-	-
Higher education	60	33.9		
<b>BMI</b>				
Less	10	5.6	22.96 Kg/m <sup>2</sup>	2.93 Kg/m <sup>2</sup>
Normal	90	50.8		
More	77	43.5		
<b>Socioeconomic status</b>				
Low < 2,173,000	126	71.2	Rp 1.532.800	Rp 1.098.220
High ≥ 2,173,000	51	28.8		
<b>Self-motivation</b>				
Poor	67	37.9	-	-
Good	110	62.1		
<b>Perception</b>				
Poor	94	53.1	-	-
Good	83	46.9		
<b>Belief</b>				
Poor	99	55.9	-	-
Good	78	44.1		
<b>Self-efficacy</b>				
Poor	101	57.1	-	-
Good	76	42.9		
<b>Family Support</b>				
Emotional support				
Good	177	100	-	-
Poor	0	0		
Informative support				
Good	32	18.1	-	-
Poor	145	81.9		
Award support				
Good	62	35	-	-
Poor	115	65		

**Table 1** Characteristics of Respondents (Cont.)

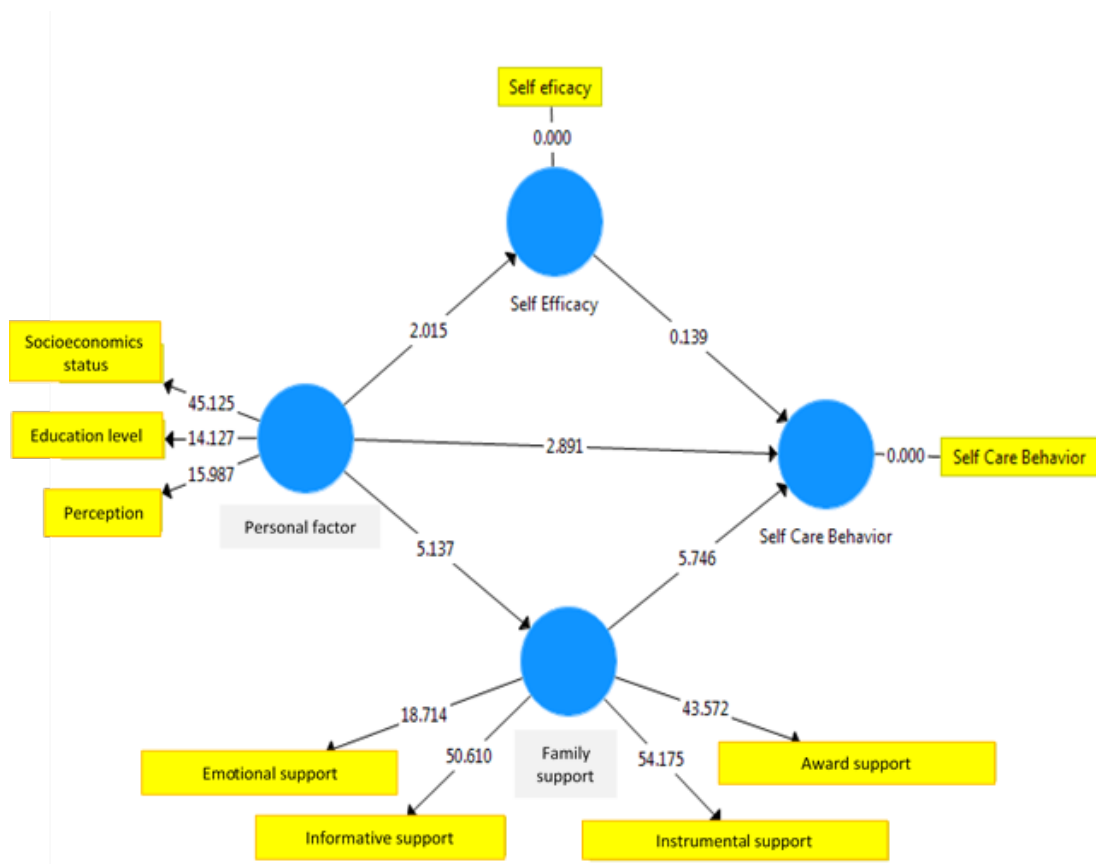
Characteristics	f= 177	%	Mean	Std. Deviation
Instrumental support				
Good	5	2.8	-	-
Poor	172	97.2		
<b>Self-care behavior</b>				
Poor	89	50.3	-	-
Good	88	49.7		

**Relationship Among Variables**

Table 2 shows that all variables had a loading factor of  $\geq .6$ . In this study, the Average Variance Extracted (AVE) value was all valid ( $\geq .5$ ). The value of composite reliability in all variables was reliable ( $\geq .7$ ).

**Table 2** Measurement model (inner model)

Variable	Sub Variable	Loading Factor	Average Variance Extracted (AVE)	Composite Reliability
Personal factor	Socioeconomic status	.907	.663	.854
	Education level	.735		
	Illness perception	.792		
Self-efficacy		1.000	1.000	1.000
Family support	Emotional support	.775	.735	.917
	Informative support	.888		
	Award support	.870		
	Instrumental support	0.889		
Self-care behavior		1.000	1.000	1.000



**Figure 1** Structural model

Table 3 T-test results

Relationship between variables	Original Sample	Sample Mean	Std. Deviation	T Statistic
Personal Factors → Self Care Behavior	.208	.212	.072	2.891
Personal Factors → Self Efficacy	.167	.172	.083	2.015
Personal Factors → Family Support	.351	.354	.068	5.137
Self-Efficacy → Self Care Behavior	-.010	-.005	.075	.139
Family Support → Self Care Behavior	.370	.368	.064	5.746

Table 3 shows that personal factors of diabetic patients influenced family support ( $t = 5.137$ ) and self-efficacy ( $t = 2.015$ ). Personal factors ( $t = 2.891$ ) and family support ( $t = 5.746$ ) influenced self-care behavior, but self-efficacy did not affect self-care behavior ( $t = .139$ ).

## DISCUSSION

This study aimed to examine the application of health promotion models in patients with type 2 diabetes mellitus in the Denpasar Health Centre area, Bali Indonesia. An interesting finding was found among variables in the model.

This study found socioeconomic status affects self-care behavior, which was in line with previous studies (Bhandari & Kim, 2016; Compean Ortiz et al., 2016; Hill et al., 2013; Le et al., 2016; Pamungkas et al., 2017). Individuals with low socioeconomic status have low levels of health literacy, stress, and depressive symptoms (Mayberry et al., 2016), and reported less confidence in the ability of self-management of diabetes, and this may be attributable to ineffective blood glucose control. But people with higher socioeconomic status have higher levels of access to health services comparing with those with lower socioeconomic status (Kirk et al., 2015; Yin et al., 2019).

Our findings also found diabetic patients had poor perception of their disease which influences their self-care behavior. Previous studies have shown that patients' adherence to diabetic self-care is related to their perceptions about the disease and its treatment (Van Puffelen et al., 2015). However, self-perception plays an important role in the self-management behavior of diabetic patients. Health perception can affect self-care, diabetes management and several aspects of quality of life (Rostami et al., 2015).

Additionally, the findings revealed that the education level of diabetes patient was in the middle category. Compean Ortiz et al. (2016) explains that those with low education level have poor self-care behavior, or a low probability of involved in diabetes mellitus health behaviors (Bhandari & Kim, 2016). Bhandari and Kim (2016) also adds that the educational status are the important factors of self-care behavior. However, educational status is strongly related to the adequate knowledge which is considered as a basis for self-management behavior in diabetic patients. Increased knowledge has associated with increased DM control (Chourdakis et al., 2014).

Family support variable also had an influence on self-care behavior. In this study, the family support variable influenced 23.2% of self-care behavior. Family support has an important role in physical, mental and socioeconomic support for diabetic patients (Lundberg & Thrakul, 2013). Family support is associated with better self-care behavior and another source that helps individuals with diabetes to improve self-care (Ridi Putra et al., 2016; Wichit et al., 2017). Other research also found family interventions improve diabetes self-management (Baig et al., 2015). In this study, the family support is likely related to emotional support (feeling comfortable, patient values and behavior), appreciation (promoting understanding of stressful events), and information support (providing advice and information), and instrumental (financial support and services) (Y. Song et al., 2017). In addition, the special role given by family members to support diabetic patients is preparing and managing food, encouraging and monitoring physical exercise and monitoring blood glucose and other self-care behaviors (Shi et al., 2016; Wichit et al., 2017). It is very important to improve the self-care of DM patients by involving families in managing diabetes patients.

The limitation of this study was that the setting of the study was limited to Denpasar, which therefore the findings might not be able to be generalized. In addition, variables that affect self-efficacy and family support were not measured, which should be done in future studies.

## CONCLUSION

Diabetes self-care behavior influenced by socioeconomic status, level of education, perception of the illness and family support. The health promotion model can be used to explain health behavior in diabetic patients. The main part that can improve the self-care behavior of diabetic patients is family support. As a nurse, it is very important to involve the family in the management of diabetic patients.

### Declaring of Conflicting Interest

We declare that we have no conflict of interest.

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#### Author Contribution

MMP developed the research proposal, conducted the study, analyzed data, and prepared the manuscript. KK guided and directed the research concepts. CPA guided and facilitated the research instruments. TS reviewed research results and publication texts.

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