RESEARCH ARTICLE

Analysis self-regulation model based on belief in self-care in type 2 diabetes mellitus patients

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Abstract

Objective: To evaluate the efficacy of the self-regulation model based on belief to enhance the ability of individuals with type 2 diabetes mellitus to take care of themselves.

Method: The survey-based study was conducted in South Sulawesi, Indonesia, from May to August 2023, and comprised type 2 diabetes mellitus patients of either gender whose blood glucose level was >200mg/dl. The survey comprised multiple questionnaires exploring the impact of exogenous variables on endogenous variables. Data was analysed using Structural Equation Modelling-Partial Least Squares method.

Results: Of the 180 patients, 97(53.9%) were women and 83(41.6%) were men. The overall mean age was 55.8±6.55 years. Of the total, 110(61.1%) patients experienced complications in the form of hypertension or stroke, and 70(38.9%) were without complications. Characteristic factors influenced problem interpretation (p=0.016) and health (*p*=0.024). Social support factors influenced problem interpretation (p=0.018) and health (*p*=0.046). Health service factors influenced problem interpretation (*p*=0.024) and health (*p*=0.006). Interpretation of problems in illness had an influence on health (*p*=0.035) and beliefs (*p*=0.014). Coping had a significant influence on self-care (*p*=0.001).

Conclusion: In order for patients to set goals and take the necessary steps to raise their awareness of performing self-care, health workers must be encouraged to increase patient confidence on solving health problems. This will have an impact on controlling blood glucose levels and preventing disease complications.

Keywords: Belief, Self-regulation, Self-care, Type 2 diabetes mellitus. (JPMA 75: 400; 2025)

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Introduction

Self-management in individuals with type 2 diabetes mellitus (T2DM) is very important to maintain blood glucose control, and to prevent complications.[1] The ability to conduct self-care in persons living with T2DM is still relatively low.[2] This is characterised by failure to control blood glucose due to non-compliance with medication, diet and lifestyle, thereby increasing T2DM prevalence and complications.[3-5]

Performing optimal self-care will improve a patient's health status so that the risk of complications can be controlled.[6,7] Individuals with T2DM need to focus on self-care to improve their quality of life (QOL).[8] One of the things contributing to poor self-care is the inability to practice self-regulation.[9,10]

T2DM has become more prevalent across the world over the years. The majority of low- and middle-income countries (LMICs) have experienced a notable spike in T2DM prevalence. However, self-regulation and self-care among T2DM patients has remained relatively low, indicating patients' lack of proper understanding of the causes and symptoms of the disease.[9] Research in China showed moderate level of self-care compliance, ranging from 33.% to 50.4%.[11] A study conducted in Makassar city of South Sulawesi region in Indonesia, with 80 respondents, showed that 68.6% of T2DM patients had self-care abilities in the low category, and 54.9% showed a low QOL category.[12]

Self-care is influenced by several factors, including knowledge, level of education, self-esteem, social support, self-efficacy, and perception of disease.[13-15] Social support also influences a patient's behaviour.[16] Regarding self-regulation behaviour, there are factors that can support a person's self-regulation, like social support and health services. Because one of the factors contributing to a patient's poor self-care ability is self-regulation, beliefs shape the self-regulation process.[17,18] Therefore, to be able to manage the disease effectively, a self-regulation model approach is needed to control the emotions and self-concept of T2DM patients. The current study was planned to evaluate the efficacy of the self-regulation model based on belief to enhance the ability of T2DM patients to improve self-care.

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Patients and Methods

The cross-sectional, survey-based study was conducted in South Sulawesi, Indonesia, from May to August 2023, after approval from the ethics review committee of the Faculty of Health, University of Mega Buana Palopo, Indonesia. The Rule of Thumb suggested a minimum sample size of 100 respondents[19] but the sample size in the current study was inflated to account for dropouts and to improve the power of the study. The sample was raised using a multistage random sampling technique from among those attending the local health centre. Those included were compos mentis T2DM patients of either gender aged >35 years with blood glucose level >200 mg/dl who were attending the out-patient clinic, and were self-dependent T2DM patients with comorbidities, such as heart disease, renal failure, anaemia, respiratory disorders, or blood cell disorders, were excluded. Data was collected after taking written informed consent from all the participants.

Exogenous, or independent variables included individual factors, disease representation, environmental factors, family factors, emotional responses, disease interpretation, and self-management. Endogenous, or dependent variables included coping and self-care. The questionnaire on individual or characteristic factors explored gender, age, history of disease, length of illness, and complications.[20] The disease representation questionnaire was modified from an identification scale, and covered causes, timelines, consequences and disease control.[9] The environmental factor questionnaire covered indicators of the physical environment and social environment,[3] while the family factor questionnaire consisted of indicators related to family development stage, family cognition, family support, family structure, and health literacy.[5] The emotional response questionnaire was a modified version of the Depression Anxiety Stress Scale (DASS-42).[10,21] The disease perception scale exploring symptoms, treatments and causes of the disease was used to create the problem interpretation questionnaire.[6] The self-management process questionnaire was developed from individual and family self-management theoretical models consisting of indicators like knowledge, beliefs, skills and social facilities.[22] The Coping Orientation to Problems Experienced (COPE) Inventory was used to create the coping questionnaire, which included indicators focussing on the patient's emotions.[17] As for the self-care questionnaire, the modified Summary of Diabetes Self-Care Activity (SDSCA) questionnaire[23] yielded results regarding blood glucose control, medication, physical activity, diet, and diabetic foot care. Measurement of blood glucose levels was done using a digital glucometer.[23,24]

The reliability and validity of each questionnaire was checked. The average variance extracted (AVE) value was used as the validity test for the questionnaires, and all variables were found to be strong and valid for use in modelling structure decision-making (Cronbach's alpha >0.678; total correlation >0.787).

Data was analysed using Structural Equation Modelling-Partial Least Squares (SEM-PLS) method to investigate the impact of exogenous variables on endogenous variables in accordance with the study's goals, including the outer model, inner model, and weight relation. P<0.05 was considered significant.

Results

Of the 180 patients, 97(53.9%) were women and 83(41.6%) were men. The overall mean age was 55.8±6.55 years. Of the total, 110(61.1%) patients experienced complications in the form of hypertension or stroke, and 70(38.9%) were without complications. The mean blood glucose level was 282.5±59.62 mg/dl and the duration of T2DM was 4.9±1.46 years (Table 1).

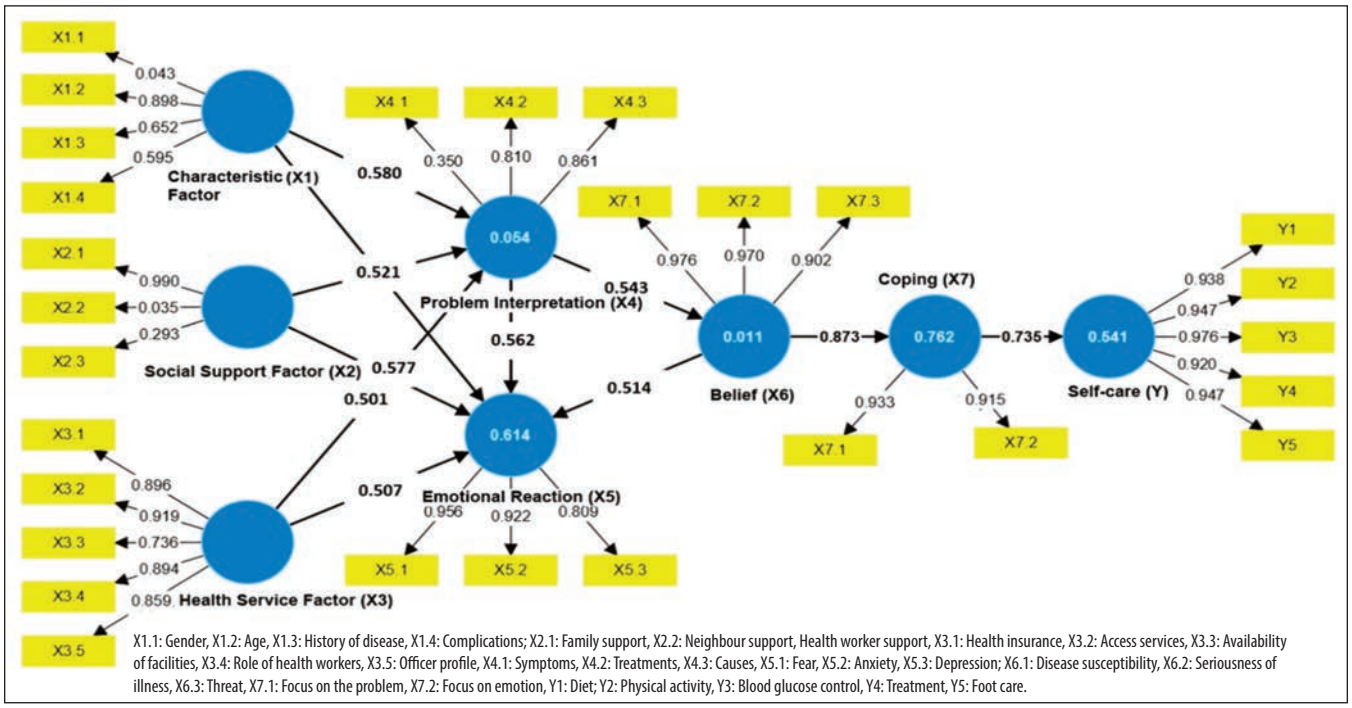
Characteristic factors influenced problem interpretation (p=0.016) and health (p=0.024). Social support factors influenced problem interpretation (p=0.018) and health (p=0.046). Health service factors influenced problem interpretation (p=0.024) and health (p=0.006). Interpretation of problems in illness had an influence on

Table-1: Characteristics of respondents (n=180).

Variable	Mean±SD	n (%)
Gender		
Male	-	83 (41,6)
Female	-	97 (53,9)
Disease Complications		
No complications	-	70 (38,9)
There are complications	-	110 (61,1)
Ages, Years (±Up to)	55.8±6.55	-
Long suffering from DM, years (±Up to)	4.9±1.46	-
Blood glucose while, mg/dL (±Up to)	282.5±59.62	-

Table-2: Hypothesis testing of the structural models.

Correlation of Variable	Coefficient	T-Statistic	*p*-value
Characteristic Factor (X1) ⟶ Problem Interpretation (X4)	0.580	2.617	0.016
Characteristic Factor (X1) ⟶ Emotional Reaction (X5)	0.521	2.795	0.024
Social Support Factor (X2) ⟶ Problem Interpretation (X4)	0.521	2.617	0.018
Social Support Factor (X2) ⟶ Emotional Reaction (X5)	0.577	2.049	0.046
Health Service Factor (X3) ⟶ Problem Interpretation (X4)	0.501	2.269	0.024
Health Service Factor (X3) ⟶ Emotional Reactions (X5)	0.507	2.108	0.006
Problem Interpretation (X4) ⟶ Emotional Reaction (X5)	0.562	1.915	0.035
Problem Interpretation (X4) ⟶ Belief (X6)	0.543	2.737	0.014
Belief (X6) ⟶ Emotional Reaction (X5)	0.514	1.946	0.007
Belief (X6) ⟶ Coping (X7)	0.873	30.752	0.001
Coping (X7) ⟶ Self-Care (Y)	0.735	13.653	0.001



X1.1: Gender, X1.2: Age, X1.3: History of disease, X1.4: Complications; X2.1: Family support, X2.2: Neighbour support, Health worker support, X3.1: Health insurance, X3.2: Access services, X3.3: Availability of facilities, X3.4: Role of health workers, X3.5: Officer profile, X4.1: Symptoms, X4.2: Treatments, X4.3: Causes, X5.1: Fear, X5.2: Anxiety, X5.3: Depression; X6.1: Disease susceptibility, X6.2: Seriousness of illness, X6.3: Threat, X7.1: Focus on the problem, X7.2: Focus on emotion, Y1: Diet; Y2: Physical activity, Y3: Blood glucose control, Y4: Treatment, Y5: Foot care.

Figure: Structure of the self-regulation model to improvement of self-care in type 2 diabetes mellitus (T2DM) patients.

health (p=0.035) and beliefs (p=0.014). Coping had a significant influence on self-care (p=0.001) (Table 2).

Beliefs had an impact on coping that shaped the self-regulation process, which, in turn, affected how well T2DM patients were able to take care of themselves and get past the challenges posed by their illness. Self-regulation's interpretation of illness problems was shaped by social support, health service, and characteristic factors. Besides, emotional reactions also directly influenced beliefs, and quality of coping influenced self-care in T2DM patients (Figure).

Discussion

The self-regulation model refers to the process of solving health-related and other problems. The model consists of 3 stages; interpretation, coping, and assessment of the success of coping. Strong self-regulation skills are necessary to control one's emotions, thoughts and behaviour. Failure to maintain self-control can lead to a person's inability to modify behaviour.[6,7] Self-regulation has an influence on glycaemic control, dietary behaviour and lifestyle which are key to managing T2DM.[18,25]

Based on the current findings, it is evident that characteristic factors, social support factors, and health service factors shape the interpretation of disease problems, which is a component of self-regulation. Apart from interpreting the problem of T2DM, emotional responses are also a problem. The self-regulation process is closely related to the emotional regulation process. When individuals want to change self-regulatory behaviour, they often face internal emotional situations. The current study shows that emotional responses influence emotional representations, such as fear, anxiety and depression. Thus, problem interpretation and emotional responses directly influence T2DM patients' confidence in overcoming the problem of their illness and have an impact on T2DM patients' coping. This shows an increase in T2DM patients' self-care abilities.

The current findings demonstrate that T2DM patients' beliefs also influence the self-regulation process. Beliefs influence individuals in efforts to change their behaviour for the better. This demonstrates how little T2DM patients know about treating their condition and maintaining blood glucose control. Therefore, for T2DM patients, maintaining healthy lifestyle habits and taking medication is primarily dependent on reinforcing personal beliefs. The outcome will be better QOL, increased patient satisfaction, and well-controlled blood glucose levels. High confidence in self-care will increase medication compliance and diet ability in T2DM patients.

Findings from several previous studies only explain the effect of self-regulation models on self-care management.[25-28] The current study evaluated the whole process self-regulation, which not only requires intention from within the patient, but also knowledge, self-efficacy, and social facilities that have the potential to influence the

patient to change. In addition, it can reflect the values and beliefs of individuals and families in preventing disease or facilitating the management of complex health management. This study also touches on self-regulation in individuals and families, and this may occur in collaboration with health professionals. It also discusses advancements in the self-regulation theory, social support theory, health behaviour modification, and research on chronic illness self-management.

Conclusion

Patients with T2DM were found to have comparatively poor self-care skills. The inability to exercise self-control to carry out advised health behaviours was one of the contributing causes. Beliefs had an impact on the self-regulation process, which, in turn, affected self-care capacity. As a component of the self-regulation process, coping was directly shaped by perception, feelings and beliefs. The self-regulation process was also influenced by characteristic factors, social support factors, and health service factors. In order to help T2DM patients feel more confident in their ability to solve health problems, the role of health professionals is critical in terms of enabling such patients to set goals to improve QOL. It is necessary to measure individual factors and social support factors so that the patients may be properly encouraged to carry out self-care.

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Conflict of Interest: None.

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NU: Concept, design, data acquisition, analysis, interpretation, drafting, revision, final approval and agreement to be accountable for all aspects of the work.
S: Drafting, revision, final approval and agreement to be accountable for all aspects of the work.
F & MEY: Concept, design, data acquisition, analysis, interpretation, final approval and agreement to be accountable for all aspects of the work.
MB: Language translation, SEM-PLS analysis, final approval and agreement to be accountable for all aspects of the work.